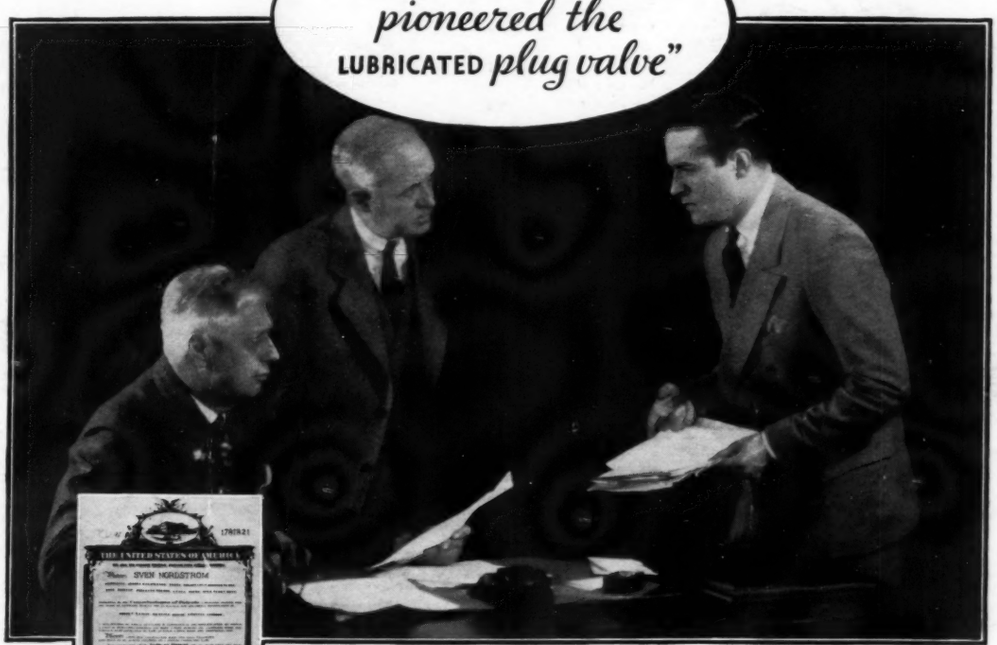
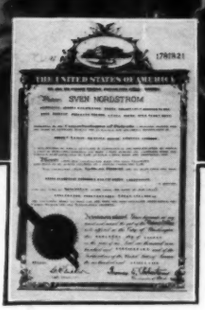
WESTERN GAS

3086

MAY 13 1934 MERCO-NORDSTROM VALVE DIVISION

"Nordstrom, sirs, pioneered the LUBRICATED plug valve"

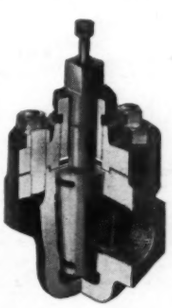




Nordstrom Plug Valves are fully protected by valid patent No. 1781821

No automobile manufacturer would claim that he was a pioneer or that he had special experience in producing automobiles because predecessors had built carriages seventy years ago. No valve manufacturer can claim he is a pioneer *lubricated* plug valve manufacturer because he built plug valves seventy years ago.

Oil, gas and chemical manufacturers have bought $15,000,000.00 worth of Nordstrom Lubricated Plug Valves in recent years, and the trend of valve sales and design has been very definitely altered. Many imitations of Nordstrom Lubricated Plug Valves have been designed in patent departments in the hope of circumventing patented features. But, even so, competing valves are made to look as much like Nordstrom valves as possible. To avoid infringement, one or more of the following features of Nordstrom Lubricated Plug Valves have been omitted or misapplied, and although several valves in the market *infringe* on Nordstrom patents, *none* of them has *all* of the following features:



1. A lubricant chamber arranged so the plug can be freed from its seat by hydraulic action regardless of the time since last operated or the degree of corrosion.

2. A series of continuous lubricant grooves, effectively sealing against leakage in open or closed position. "Sealdport" patented lubrication.

3. An automatic cut-off, preventing the loss of lubricant or pressure when grooves are exposed during valve operation.

The Nordstrom factory, designed for the exclusive production of plug valves — *is the most modern valve plant in the world.*

NORDSTROM LUBRICATED PLUG VALVES

MERCO NORDSTROM VALVE COMPANY *A Subsidiary of* **PITTSBURGH EQUITABLE METER CO.**
Main Offices: Pittsburgh, Penna. Branch Offices and Warehouses in Principal Cities

May 1934 ♦ ♦ 25 Cents

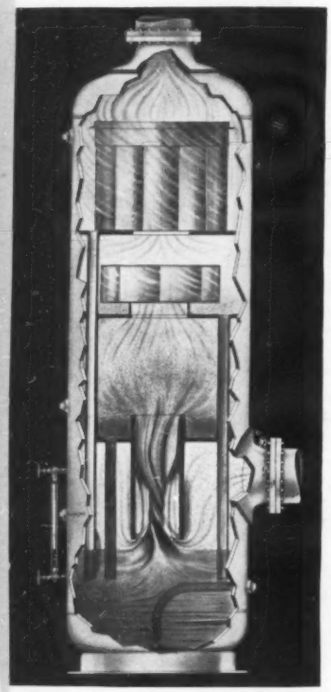
0.0007 m.m. Ø

DUST AS FINE AS THIS

was found in an analysis of coke oven gas before installation of a **Blaw-Knox Gas Cleaner.** The complete analysis is as follows:—

98%	passes	30	mesh	screen
90%	"	60	"	"
71%	"	100	"	"
40%	"	200	"	"
20%	"	350	"	"

Finest grain measured 0.0007 mm. diameter.
70% Iron oxide.



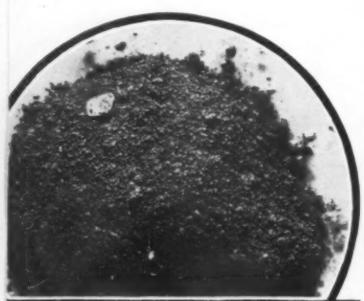
t away drawing showing operation of Blaw-Knox Gas Cleaner.

Dust of this character is common in most gas lines. It clogs burners, cuts out valves, slows meters, increases maintenance costs and disturbs public relations.

In this particular case as in many others, there has been no recurrence of dust troubles since the installation of a **Blaw-Knox Gas Cleaner.**

Blaw-Knox Gas Cleaners offer a proven profitable investment to the transmission line operator and to the distributor of natural or manufactured gas. They protect compressors against the erosive effect of scale and sand. They insure continuity of service and increased customer satisfaction.

Let us show you specifically what we can do for your conditions.

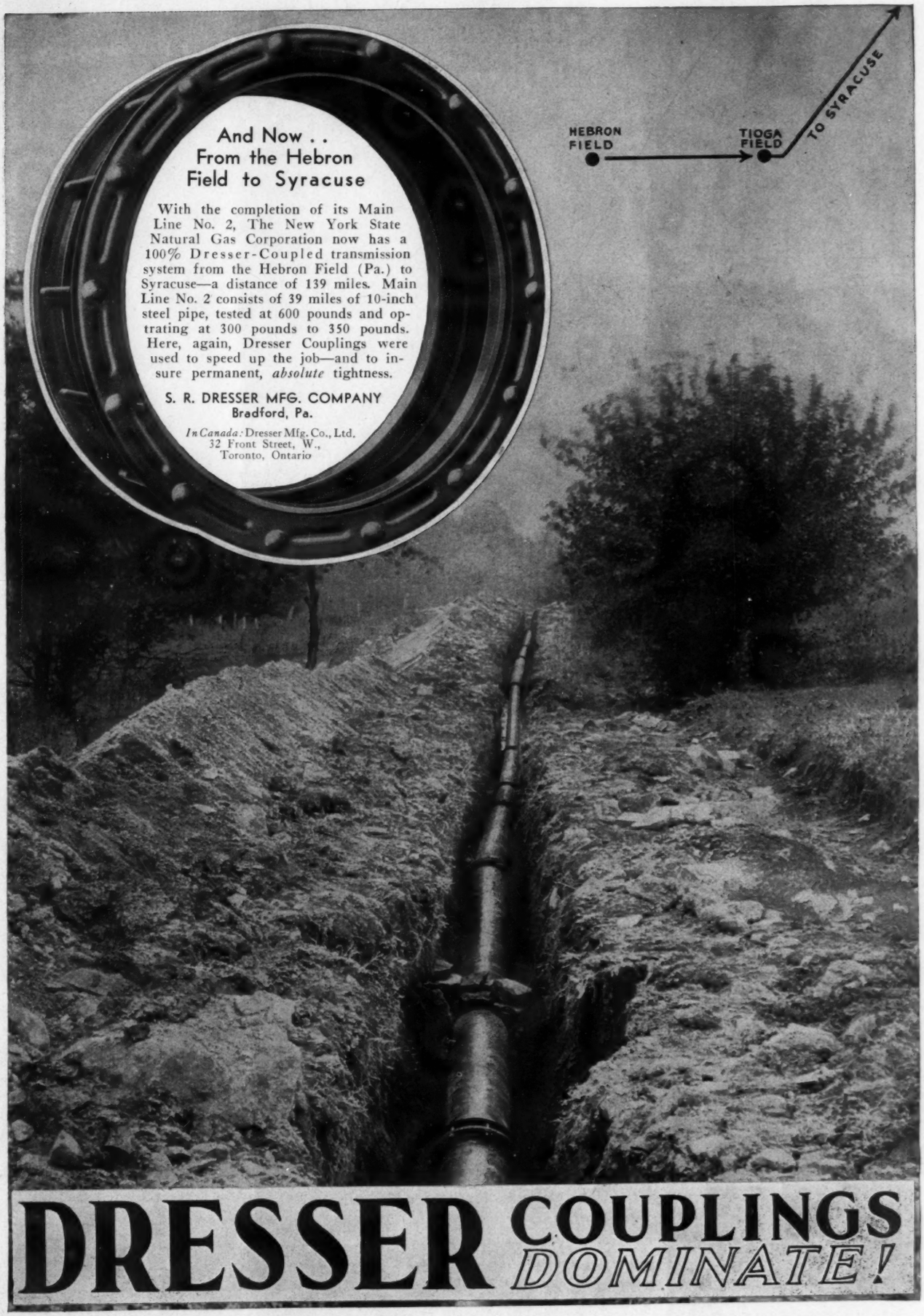


Keep this dirt out of your compressors, valves, etc., and insure continuity of service.

BLAW-KNOX COMPANY

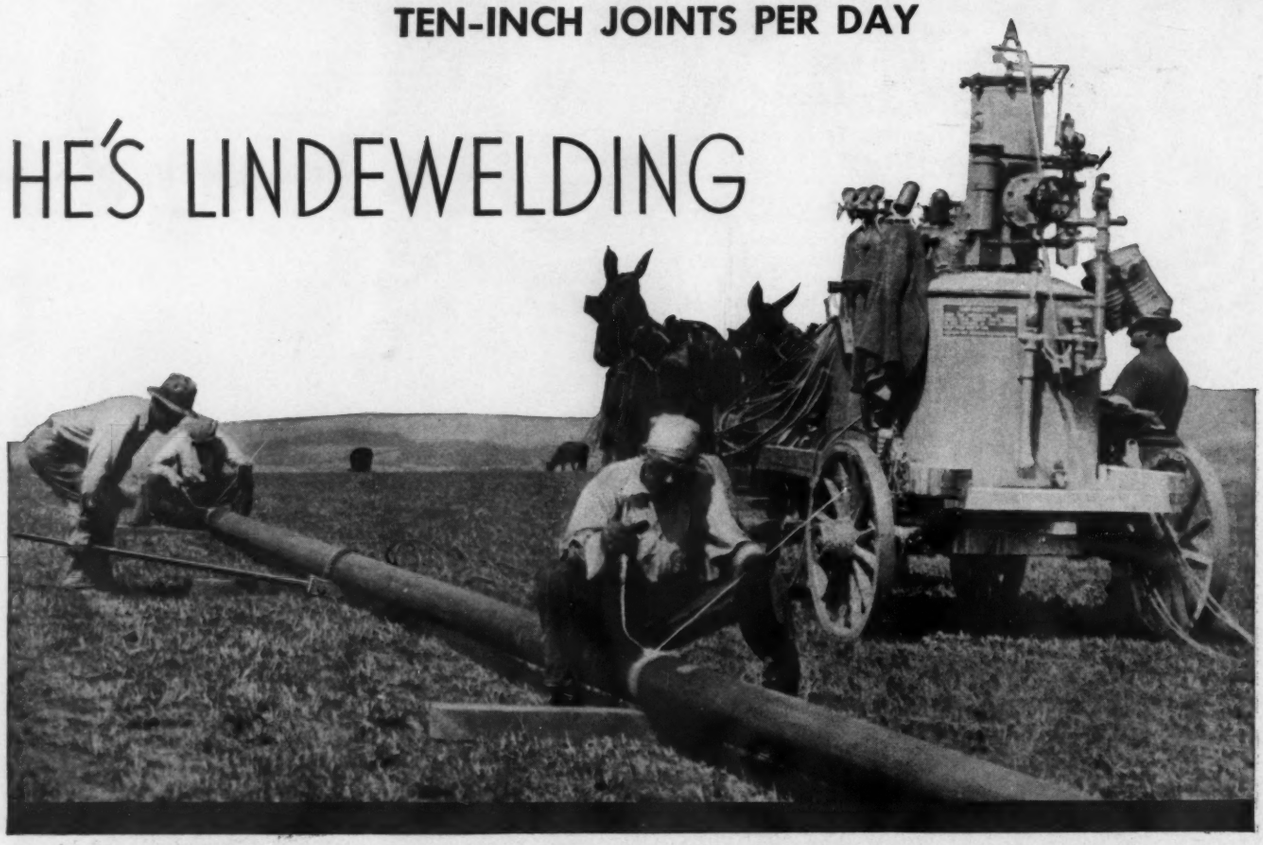
2008 Farmers Bank Building,
Pittsburgh, Pa.

BLAW-KNOX GAS CLEANERS


And Now . .
From the Hebron
Field to Syracuse
With the completion of its Main Line No. 2, The New York State Natural Gas Corporation now has a 100% Dresser-Coupled transmission system from the Hebron Field (Pa.) to Syracuse—a distance of 139 miles. Main Line No. 2 consists of 39 miles of 10-inch steel pipe, tested at 600 pounds and op-trating at 300 pounds to 350 pounds. Here, again, Dresser Couplings were used to speed up the job—and to in-sure permanent, absolute tightness.
S. R. DRESSER MFG. COMPANY
Bradford, Pa.
In Canada: Dresser Mfg. Co., Ltd.
32 Front Street, W.,
Toronto, Ontario
HEBRON FIELD
TIOGA FIELD
TO SYRACUSE
DRESSER COUPLINGS DOMINATE!

May, 1934, Volume X, Number 5. Western Gas is published by Western Business Papers, Inc., at 810 South Spring Street, Los Angeles, California. Subscription price (in advance) 25 cents the copy; $2.00 per year; 2 years, $3.00; $3.00 per year foreign. Entered as second class matter June 1, 1925, at the postoffice at Los Angeles, under the Act of March 3, 1879.

WHEN A WELDER Makes 42 TEN-INCH JOINTS PER DAY



HE'S LINDEWELDING

LINDEWELDERS on a 200-mile 10-in. oil line in East Texas averaged from 35 to 42 Lindewelds a day each. Every joint tested strong and tight.

Lindewelding makes records like this because it is a better and faster method of oxy-acetylene welding. It reduces welding time 50 to 67 per cent. and reduces consumption of welding materials 25 to 50 per cent.

Lindewelding can be done with an ordinary blowpipe or with special apparatus which makes the welding almost automatic and further increases its speed. Experienced welders quickly master Lindewelding technique, and beginners learn it more rapidly than other methods.

Procedure Controls for Lindewelding are available to all users of Linde Oxygen as a part of Linde Process Service. If faster welding, stronger joints, and lower costs would mean bigger profits this year, ask our nearest district office for complete information today.

Study Lindewelding Technique in this Motion Picture

Our motion picture, "The Lindeweld Process for Pipe Line Construction," shows every detail of Lindewelding technique, which differs from neutral flame welding technique in that it employs a special rod, a special flame adjustment and the "backhand" method of blowpipe manipulation. It reveals the actual steps in making a Lindewelded joint. Pipe line officials and welding or engineering societies may borrow this picture free of charge by writing to any Linde District Office. It is furnished in 16 mm. and 35 mm. safety film.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

126 Producing Plants UCC 627 Warehouse Stocks

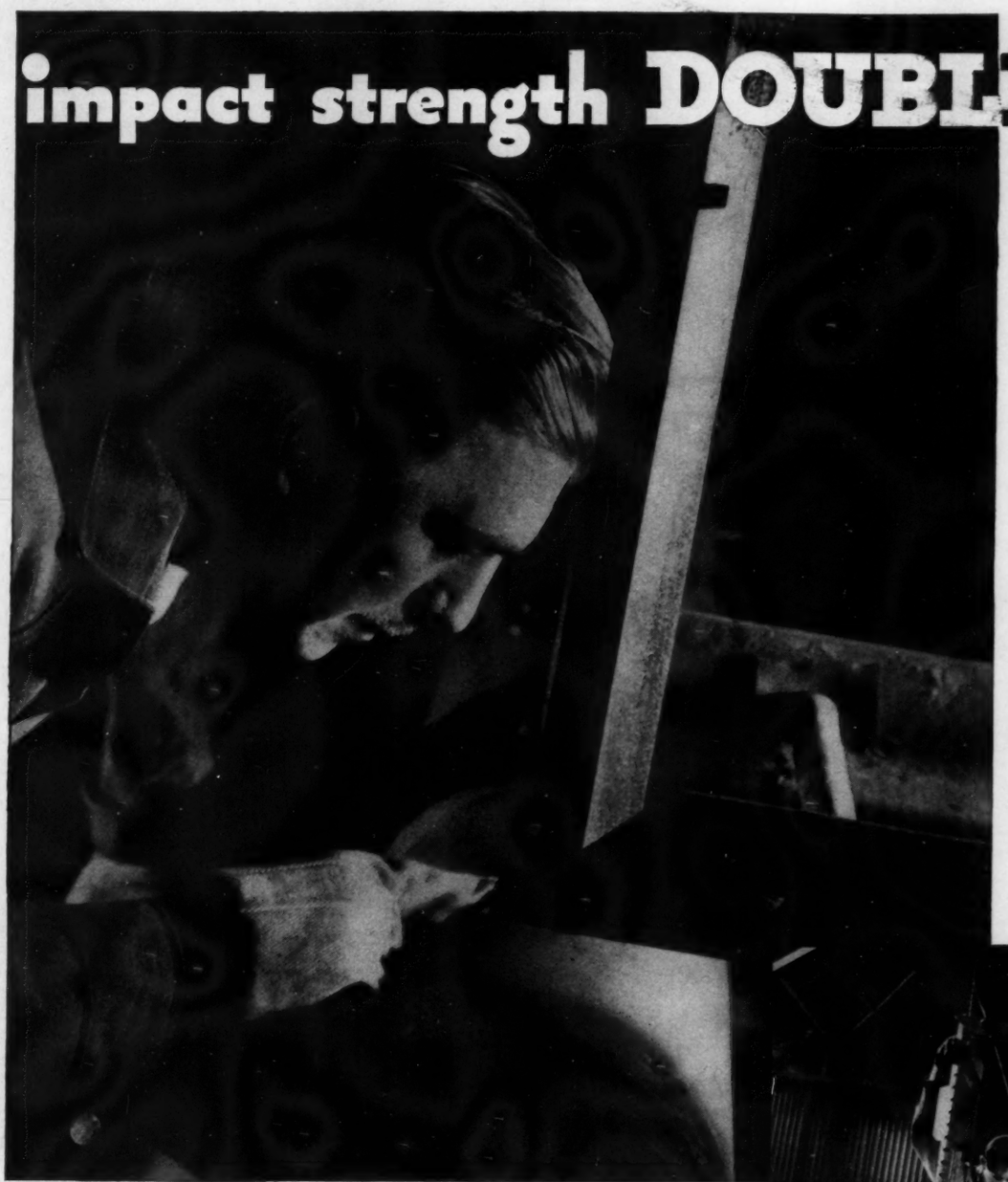
IN CANADA, DOMINION OXYGEN COMPANY, LTD., TORONTO

Sales Offices:

Atlanta	Detroit	New York
Baltimore	El Paso	Philadelphia
Birmingham	Houston	Phoenix
Boston	Indianapolis	Pittsburgh
Buffalo	Kansas City	Portland, Ore.
Butte	Los Angeles	St. Louis
Chicago	Memphis	Salt Lake City
Cleveland	Milwaukee	San Francisco
Dallas	Minneapolis	Seattle
Denver	New Orleans	Spokane
		Tulsa

LINDE OXYGEN · PREST-O-LITE ACETYLENE · OXWELD APPARATUS AND SUPPLIES · UNION CARBIDE

impact strength DOUBLED



Photos show test to measure impact resistance of Super-de Lavaud Pipe while under internal hydraulic pressure of 65 pounds per square inch and submitted to blows from 50-pound hammer. Hundreds of such tests over a period of more than a year demonstrate that this new pipe is shatter-proofed to the extent that impact resistance has been increased more than 100 per cent.

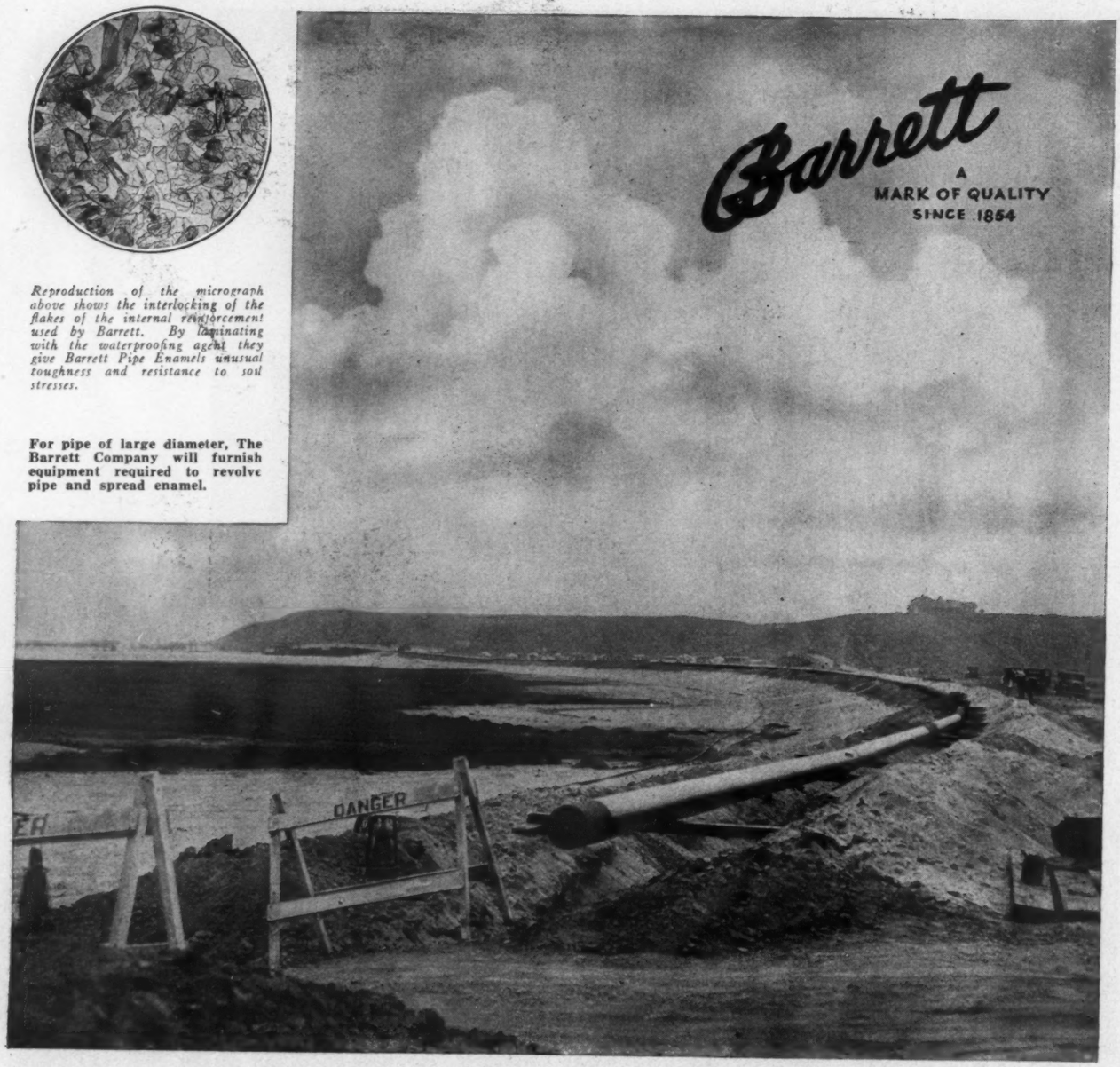
The greatly increased impact resistance and the non-shattering characteristic of our new Super-de Lavaud Cast Iron Pipe are the result of a patented improved process of centrifugal casting and a patented annealing process. Super-de Lavaud Pipe is *cast without chill in a metal mold.* The process is a basic discovery producing a revolutionary metallurgical change. The product is *tougher;* capable of *greater deformation without breakage; does not shatter* when tested to destruction by hydrostatic pressure. Impact resistance is *more than doubled* giving maximum protection from plant to underground. Send for descriptive booklet.

UNITED STATES PIPE AND FOUNDRY CO., BURLINGTON, N.J.
Foundries and Sales Offices throughout the United States

U.S. SUPER-DE LAVAUD PIPE

Reproduction of the micrograph above shows the interlocking of the flakes of the internal reinforcement used by Barrett. By laminating with the waterproofing agent they give Barrett Pipe Enamels unusual toughness and resistance to soil stresses.

For pipe of large diameter, The Barrett Company will furnish equipment required to revolve pipe and spread enamel.



No coating gives better or longer-lasting protection

Immune to moisture . . . to earth acids and currents . . . to disintegration from submersion—Barrett Pipe Line Enamels inhibit corrosion and the destructive action of the elements and electrolysis. They provide a tough, adhesive film which has great dielectric strength and stability, giving effective insulation and protection . . . underground, underwater or in salt marshes. Applied to Barrett Specifications, Barrett Pipe Line Enamels represent the maximum in protective efficiency. The Barrett Technical Staff and Field Engineers will gladly cooperate with you. 'Phone, wire or write.

Barrett Specification

PIPE LINE ENAMELS

THE BARRETT COMPANY, 40 Rector Street, New York, N. Y.

ADVERTISERS' INDEX

American Meter Company 6
American Stove Company 35
Automatic Products Co. —

Barber Gas Burner Co. 45
The Barrett Company 4
H. R. Basford Co. 48
The Blaw-Knox Co. 2nd Cover
Butane Sales Co. 30

The Cast Iron Pipe Research Assn. 38
The Chaplin-Fulton Mfg. Co. 41

Dearborn Chemical Co. 46
The Denver Fire Clay Co. 42
S. R. Dresser Mfg. Co. 1

Electrogas Furnace & Mfg. Co. —
Electrolux Refrigerator Sales, Inc. 37
The Estate Stove Company —

Fraser Furnace Company 48

General Ceramics Co. 41
James Graham Mfg. Co. —

Harry F. Haldeman, Inc. 42

Johnson Gas Appliance Co. 40
Jones & Laughlin Steel Corp. —

Kerotest Company 28

The Linde Air Products Co. 2

Merco Nordstrom Valve Co. Front Cover
Minneapolis-Honeywell Regulator Co. 42

National Tube Company —
Natural Gas Equipment Co. 43

Oxweld Acetylene Co. 2

Pacific Coast Gas Association 27
Pacific Gas and Electric Co. 39
Pacific Gas Radiator Co. 46
Payne Furnace & Supply Co. 38
Pittsburgh Equitable Meter Co. Front Cover
Pressed Steel Tank Co. 31
The Prest-O-Lite Co., Inc. 2

Reliance Regulator Corp. 31
Republic Steel Corp. Back Cover
Reynolds Gas Regulator Co. 45
Robertshaw Thermostat Co. —
Ruud Manufacturing Co. —

Safety Gas Main Stopper Company 43
Wm. B. Scaife & Sons Co. 30
South Chester Tube Co. 48
The Sprague Meter Co. 47

Union Carbide & Carbon Corp. 2
Union Carbide Sales Co. 2
United States Pipe and Foundry Co. 3

Ward Heater Company 40
William Taylor Hotel 41

WESTERN GAS

"Reg. U. S. Pat. Off."

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Contents for May, 1934

Review of the Month 7

Planning for House Heating Sales 9
By Henry O. Loebell

Advertise *Advertising* for Dealer Tie-In 11
By George H. Finley

Natural Gas as Sponge Iron Reductant 12
By C. G. Maier and S. B. Thomas

ABSTRACTS 16
Distribution 16
Plant Practice 19
Utilization 20
Load-Building 21

PACIFIC COAST GAS ASSOCIATION 22

BUTANE-PROPANE NEWS 29
14.1 Per Cent Gain Shown in 1933 Sales Totals 29

MEASUREMENT AND CONTROL 32
The Emco-McGaughy Integrator 32
By J. L. Cottrell

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SECURITY

• FOR YOUR METER DOLLAR

Metering costs are being scrutinized as never before by progressive gas company executives. The whole metering situation is being weighed in terms of the greatest possible return on every meter dollar invested. • Traditional practice is being checked against the fact-finding results of reliable meter records. • In every such case, the advanced meter design and the improved materials and construction of modern meters will prove a protection against the higher, continuing upkeep cost of outmoded types.

. . . also RELIANCE REGULATORS for close pressure control and positive lock-up.

AMERICAN METER COMPANY
INCORPORATED
Measurement and Control of Gas, Oil, Steam, Air and Liquids
ESTABLISHED 1836

Meter Trade Names:
AMERICAN—D. McDONALD—METRIC—MARYLAND—PACIFIC—TUFTS

Albany Baltimore Birmingham Boston Chicago Dallas Denver Erie Kansas City
Los Angeles Philadelphia Pittsburgh New York San Francisco Tulsa

187

May, 1934

WESTERN GAS

"Reg. U. S. Pat. Off."

Vol. X, No. 5

A Monthly Journal of the Gas and Gas Appliance Industries in *Western America*

More Fertile Fields

DISCONTINUANCE of the National Electric Cookery Council, which not so long ago had ambitious plans for national advertising and other promotion of the electric range, has been announced. Electric range manufacturers explain that the Electric Home and Farm Authority is demanding such low-cost merchandise for sale in the Tennessee Valley that no funds are available for national advertising. This is an unlooked-for offshoot of T.V.A. activities, to say the least.

School Idea for Refrigeration

TO THE editorial desk this month came word of a carefully planned refrigeration institute, something new in cooking schools. Held along the line of the successful newspaper cooperation cooking school, this institute by lecture demonstrations will show housewives ways to economize on foods and to prepare attractive recipes with the aid of the automatic refrigerator.

One fact took the lustre off this refrigeration institute plan—it was an all-electric idea, though conducted by a combination company. Aggressive gas home service departments through the summer months can make gas refrigeration the central theme of school demonstrations, tying into nation-wide sales work already well under way this year on the gas refrigerator.

Newspapers and the Word "Gas"

A. G. A. Headquarters recently asked several representative gas companies whether they regarded newspaper misuse of the word "gas" in reports of explosions and asphyxiations as harmful to the industry. Also, those companies which had attempted to get the cooperation of newspaper editors in using "gas" more accurately, were asked to state what response was obtained from the newspapers.

On the first point there was no agreement, some companies feeling that the industry's appliance sales suffer from this type of publicity, others taking the stand that danger angles have never prevented the American public from buying anything.

More significant was the response to the question dealing with editorial cooperation. It appears that newspapers as a rule are fully sympathetic with the gas company's problem and are willing to do everything possible to insure accurate report of accidents and avoid misuse of "gas."

This conclusion is borne out in the experience of one large western utility, which participated in the A.G.A. exchange of opinion. The advertising department of this company was alert enough to query editors on its system for their views about use of the word "gas." Nearly all of the papers replying stated that the matter was being called to the attention of the copy desk, and voiced the intention of cooperating for more careful treatment of "gas" in headlines and copy.

Utility, Business Earnings Compared

IN SETTING up a defense against reduction of Cincinnati Gas & Electric Co. rates before the Ohio State Utilities Commission the Columbia Gas & Electric Corp. last month submitted detailed evidence to show that its Cincinnati subsidiary's earnings fell far below the earnings of general business enterprises in the same section. Statisticians showed that 38 companies operating in the Cincinnati area, with securities listed on the Cincinnati Stock Exchange, in 1930 earned an average of 13.27 per cent after depreciation and taxes. Companies selected for the comparison were those with which the local utility would have to compete for capital.

In developing its case along these lines the Columbia company starts from the position taken by the United States Supreme Court, that utilities are entitled to earn a return equal to that generally made at the same time and in the same general part of the country on investments in other business which is attended by corresponding risks.

With state commissions showing a tendency to insist upon lower rates of return than have prevailed

in the past it will be interesting to see what results attend the Columbia G. & E. contention that its Cincinnati subsidiary is entitled to earn up to 10 per cent on total capital invested.

Better Showmanship Needed

A COMMERCIAL manager of a combination company writes *Western Gas* in connection with his spring sales activities, and makes strong complaint against gas appliance manufacturers as a group. Says this commercial man: "Our company spends 80 per cent of its time selling gas and only 20 per cent selling electricity; still our boys get their selling ideas from the electrical industry and apply them to selling gas appliances."

While three or four gas appliance firms readily occur to us as doing an excellent and aggressive job of promotion for their products, there is more than a little general truth in this commercial manager's observation—much as we hate to admit it.

Our correspondent urges that gas appliance makers take a few leaves from their electric contemporaries' books, and illustrates by referring to a recent company sales conference at which appliance models were introduced by manufacturers' representatives. Without exception the electric manufacturers came prepared to make their message stick with the salesmen, through charts, movie or still camera equipment, cutaway models, etc. In contrast, the gas appliance presentations lacked all graphic touches, consisted mainly of dry-as-dust papers full of statistics.

Perhaps the picture is a bit overdrawn, but, we repeat, there is too much truth in it. Gas appliance manufacturers are giving the industry remarkable equipment; their promotional methods should be equally modern.

More Scope for Federal Financing?

TENNESSEE Valley Authority's electrical appliance operations are showing progress—that is, progress from the T.V.A. viewpoint. Director Lilienthal is quoted in the current press as stating that electric refrigerator prices submitted for T.V.A.-financed units are from 20 to 30 per cent below current retail prices, with electric range prices running even lower; it is indicated that refrigerators from $50 to $80 will be offered. Financing of electric appliances was expected to be launched by the Electric Home and Farm Authority, T.V.A. subsidiary, in May throughout the Tennessee Valley states.

Most vicious of recent developments is the statement credited to Director Lilienthal that the E.H.F.A. will be prepared to finance sale of low-cost electric appliances on the Pacific Coast and elsewhere by Fall of this year. This prospect should give pause to anyone who has been regarding T.V.A. operations as far removed from his own geographical scene.

More ramifications of the E.H.F.A. venture came to light in April. Advertising and merchandising counsel has been engaged by this government agency for a four-month trial period, looking to a long-time campaign of research and public education to increase kilowatt-hour consumption in the Tennessee Valley area. The E.H.F.A. press publicity director is quoted as stating that while no decision has been reached to carry on space advertising, the idea may be extended "to include advertising not only in the Tennessee Valley, but in other parts of the country."

Getting under way the middle of May, the E.H.F.A. enterprise provides for electric appliance showrooms in Tupelo, Miss., Nashville and Chattanooga, Tenn. Traveling showrooms will also be operated, and literature will be prepared for school and library use. This last item brings special interest, for publicity efforts of utilities have been stigmatized as propaganda when they even remotely touched the schools.

Out of its $10,000,000 credit extension from T.V.A. the E.H.F.A. will disburse to dealers the full sales prices on term-contract purchases. The program disavows any intention of interfering with regular retail outlets for electrical appliances; Commonwealth and Southern Edison will sell the manufacturers' T.V.A. lines on its 450,000 meter system. Installment billings on T.V.A. contracts will be included monthly in light bills. Here again the government encourages a practice which has provoked criticism when engaged in by utilities.

While the immediate effect of government financing and promotional activities in the Tennessee Valley may be more-kilowatts-sold, the electrical industry will get small consolation from that fact; it will be too busy wondering where the program is headed, and whether it can ever be stopped.

As for the gas industry, it is not enough to regard this electric appliance financing merely as a new and unfortunate form of competition, though it is certainly that. More fundamentally, however, it is setting precedent for government control of appliance sales policies through command of credit resources.

Several weeks ago the American Gas Association addressed a protest to Secretary Ickes of the Interior Department, T.V.A. Chairman Morgan, and T.V.A. Director Lilienthal. It pointed out that the government's electric appliance financing is clearly violative of fair trade practice unless the same facilities are made available for gas appliance purchases in these territories, since gas and electricity are in direct competition.

An alternative suggestion is that the gas appliance industry set up its own financing organization to put consumer purchases on the same basis as the government- financed electric purchases.

While such proposals as the above may offer possibilities for getting more gas appliances into service they have little bearing upon the real issue—whether further government incursion into any phase of the utility services should be tolerated. This is the definite challenge to all private utilities—one which should get united action while action is still possible.

By HENRY O. LOEBELL
Natural Gas Pipe Line Co. of America
Chicago, Illinois

Planning for House Heating Sales

THE House Heating & Cooling Committee of the American Gas Association is sponsoring a series of articles that will cover all phases of house heating and cooling by gas. This is the first of the series and is presented by the Sub-Committee on Load Building Plans, Mr. Loebell, Chairman. Subsequent treatises will cover installation and maintenance, controls and their application, retention of present customers, winter air conditioning, summer air conditioning, heat conservation, individual apartment heating, advertising, competitive fuels, relative cost, and commercial unit heaters.

THE problem of expanding sales is one which is confronting practically every gas company in the country. No field offers a greater opportunity for expansion than the house heating field.

There are few companies which cannot profitably increase their house heating sales to some extent. There are, of course, limits to economic expansion but few companies have reached a saturation which entirely precludes further sales.

In this day when competition is severe and expenses must be held to a minimum, the problems confronting sales executives are not readily solved. Yet it is frequently possible to discover a feasible course of action by employing the elements which comprise scientific salesmanship in one comprehensive plan.

Scientific salesmanship or planning is not anything particularly new or mysterious. Planning merely means keen analysis of the markets and conditions essential to sales success. It differs from ordinary sales methods in that the problems and objectives of a planned sales campaign are known in advance. It differs from the "cut and try" methods generally employed by determining the probable results in advance with a fair degree of accuracy.

The success of a planned sales effort is dependent upon the studies made prior to taking action. Because these studies sometimes appear to be complicated and foreign to the subject, they are frequently discounted and rejected by executives unfamiliar with the results which can be produced. In their place is substituted the age-old policy of reducing rates in order to secure business by the sheer weight of lowered cost. During periods when competition is not as severe as it is at present, this latter method has produced satisfactory results. It will continue to produce increased sales even at the present time, but it never has and it never can produce the maximum amount of profit possible because it fails to ascertain that goal in advance and hence establishes no standard of measurement.

Today management is concerned with maximum profit at minimum expense. This necessitates complete analysis of potential markets and requires that sales managers employ the most scientific methods available to support their recommendations and policies.

Certain companies have experienced unusual success in developing the house heating field by following a well-defined plan which is applicable to almost any situation.

The Plan: This plan is based upon a detailed analysis of the potential market in order to determine the conditions essential to a successful sale. It is followed up by an intensive educational and sales campaign designed to cover the territory rapidly and present the sales story to every probable purchaser. The plan requires the complete cooperation of every department of the company and for this reason it is of interest to the executive as well as to the sales branch of the industry.

The Initial Survey: In developing the plan it is assumed that every user of heat is a potential prospect for gas until proven otherwise. Consequently the first step is to find out the number of people using heat in any form. This information can generally be obtained from local chambers of commerce, realty boards, etc. It will show the number of single family residences, two family flats, apartments, etc., together with the percentage of occupancy.

The number of occupied buildings will be the maximum potential market.

OBVIOUSLY, however, not all of these people will purchase gas. Some of them will be connected with the coal business. Others will be oil burner salesmen, manufacturers, or distributors of fuel oil. Still others will have fixed prejudices against gas which cannot be overcome.

After eliminating this class of people there will remain a large majority with various incomes which represent the ultimate potential market. Some of these people will be wealthy enough to spend any amount of money for the advantages of gas heat if they are convinced of its value. Others will be able to spend no more for gas heat than they now spend for coal regardless of the advantages which gas may possess. Between these two groups will lie the great mass of people who can spend something extra for gas heat if they are sold on the value of the additional expense.

It is obvious that the volume of sales which can be secured from this group will be dependent upon the additional cost of gas heat. Furthermore, this cost must be broken down into equipment cost and gas cost.

While many people might accept the increased cost of the gas itself, they would not be able to purchase the equipment essential to its use. Hence, it is necessary to consider the cost of the equipment as a part of the cost of gas heat and determine the market potentials accordingly.

Under such circumstances, it is apparent that a payment plan on the equipment reduces the "out-of-pocket" expenditure and permits the acquisition of a larger number of customers. Moreover, it relieves the prospect from making a definite capital outlay which in itself is a formidable barrier at the present time.

For this reason a payment plan on equipment within the reach of this portion of the public is suggested as the best method of securing volume under present day conditions.

The immediate problem is to determine the number of people who do have surplus income together with the amount of the surplus.

THIS information can be obtained by a study of income tax returns, living costs and various other government statistics when combined with an actual cross section survey of portions of the community. It is obvious that this is not a task which can be undertaken readily by any one. While the necessary statistics are generally available their interpretation should be left to a skilled market analyst who has had experience in studying the house heating market.

This is especially true because the consumer survey should attempt to uncover the opinions held by the public with respect to gas heat, the standing of the gas company, and the resistances which will be met in a house heating campaign. Obviously no company could expect to secure an impartial survey of such facts with its own personnel which is an added reason for employing competent marketing counsel for this portion of the work.

A thorough analysis of the market will result in a summary which will show the annual premium which various numbers of people will pay for gas heat over and above the present cost of coal. This summary will have the following general appearance.

No. of heated residential buildings in city	2,200
No. of buildings occupied	2,100
No. of buildings eliminated by conflicting interests of tenants	100
No. of potential prospects when gas costs no more than coal	2,000
No. of potential prospects when gas costs $10 per year more than coal	1,000
No. of potential prospects when gas costs $20 per year more than coal	600
No. of potential prospects when gas costs $30 per year more than coal	450
No. of potential prospects when gas costs $40 per year more than coal	320
No. of potential prospects when gas costs $50 per year more than coal	200
No. of potential prospects when gas costs $60 per year more than coal	140
No. of potential prospects when gas costs $70 per year more than coal	80
No. of potential prospects when gas costs $80 per year more than coal	60
No. of potential prospects when gas costs $90 per year more than coal	40
No. of potential prospects when gas costs $100 per year more than coal	20

The Rate: Upon obtaining the foregoing data, it is possible to compute the house heating rate. The cost which people will pay for gas for house heating will be the cost of their present fuel plus the annual premium required for gas heat.

It is obvious that all of the people of a community will not heat with the same grade of fuel nor will they use the same volume. The largest homes in a city are generally occupied by the wealthiest citizens. Strangely enough these are not the best prospects for gas heat because the task of firing a furnace is generally done by a servant. The best prospects for automatic gas heat are the middle class citizens who have some surplus income but who also take care of part of the household duties.

The well-to-do people in this classification will perhaps use anthracite coal, coke or oil. As the potential market increases the gas competition will be found in the cheaper grades of coal.

It is therefore essential to analyze the fuel competition and determine the number of people who use anthracite coal, coke, oil and the various grades of coal. It is also necessary to determine the quantity of fuel used by the average resident.

From these data it will be possible to compute the average cost of fuel used per season and the quantity of gas necessary to displace the existing fuel. It will be found that the volume of gas required for the average resident who uses hard coal, coke or oil will be larger than that required for the average resident who uses soft coal. This is due to the fact described above that the users of the better grade fuels generally live in the larger homes. In making this calculation, little dependence should be placed in laboratory tests on furnace efficiencies. Laboratory tests reveal that gas should be burned with an efficiency of 80 per cent, oil 75 per cent, and coal 60 per cent to 65 per cent in an ordinary furnace. In actual practice, however, the efficiency of gas will be closer to 70 per cent, oil 60 per cent, and coal 45 per cent to 50 per cent.

TO the cost of the existing fuel must be added the annual premium which the prospect will pay for gas heat. This total cost divided by the volume of gas necessary to displace the existing fuel will give the unit rate per M c.f. which will be paid for gas.

As a result of this calculation, it will be possible to prepare a table showing the number of customers which can be obtained at various rates for gas and the volume of gas which can be sold at these various rates.

This is about as far as the sales department can go unaided.

Costs and Expenses: The sales executive should now turn these data over to the operating department and request the incremental cost of various volumes of additional gas, the new investment required to serve additional house heating customers, and the cost of serving such additional customers.

IN compiling these cost estimates, care should be taken to include only those costs which increase purely because of the added load. It is recognized that all business should carry its proportionate share of overhead costs. However, new business which yields a margin of profit in excess of its actual "out-of-pocket" cost is always desirable business and hence this expense estimate should be confined to incremental costs alone.

Determining the Sales Objectives: Upon receipt of this information, the sales department will be able to compute the combination of new customers, rate and expense which yields the maximum profit without reference to sales expense. While this number of customers may not be the most desirable when sales expense is included, it will probably be close enough for initial consideration.

The Sales Resistances: At this point consideration should be given to the sales resistances which will have been determined by the original survey. As the resistance of cost has been met by the calculated rate, the only remaining economic barrier will be the cost of the equipment.

This is a major obstacle to sales volume at the present time. The public is not in a mood to make definite commitments for household appliances requiring a large cash outlay. They are, however, agreeable to accepting any labor-saving device which can be paid for on small monthly payments, and resistance disappears completely when the equipment is offered on a rental basis which permits cancellation and removal at the customer's option. This plan does require the investment of considerable capital in equipment. However, the rental charge can easily be sufficient to cover the interest and amortization of this sum, including an amount adequate to cover the losses on removals.

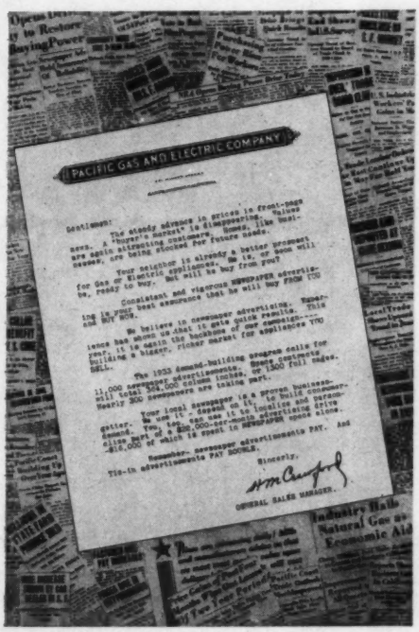
With the rate established at a level to permit the connection of the desired number of jobs, and with the equipment problem solved by a rental plan, the task is reduced to the advertising and sales technique.

The methods employed to obtain sales will depend upon the ultimate goal. If the objective is sufficient to warrant large scale sales efforts, a mass selling campaign should be considered. If, however, the number of jobs to be secured is small, individualized selling efforts will be required. In either case the selling principles will be identical but the methods employed will of necessity differ.

(Continued on Page 40)

Advertise *Advertising* for Dealer Tie–In

P. G. and E. Finds That It Pays



A NEW CAMPAIGN
TESTED LIGHT for BETTER SIGHT
COVERING ALL P. G. and E. ELECTRIC TERRITORY . . .
231 NEWSPAPERS · 35 WINDOW DISPLAYS · 500,000 BILL STICKERS
SMASHING FORCE!
291 DAILY AND WEEKLY NEWSPAPERS WILL BE USED
NEWSPAPER SPACE WILL TOTAL 180 FULL PAGES
2,000,000 READERS WILL THINK . . . GAS HEAT
Thousands of new prospects are being made to WANT Gas Heat by this advertising . . .
Is your TIE-IN AD appearing alongside . . .
Telling them HOW to get it . . . and WHERE
POSTER DESIGN
TO APPEAR ON
305 Full Size Bill Posters
1080 Truck Signs
500,000 Bill Stickers

● Illustrations show dealer broadside sent each month to P. G. and E. dealers. At left is the first page, a letter from General Sales Manager H. M. Crawford; above is the inside spread of the broadside, reproducing company advertising in advance of publication.

By GEORGE H. FINLEY

Editor, Western Gas

FOR many years the Pacific Gas and Electric Co. has placed a strong and consistent volume of advertising support behind its load-building gas sales activities. In recent years, special attention has been given to securing a maximum degree of advertising cooperation from dealers, in recognition of the fact that gas sales and the individual cooperating dealers would benefit in exact proportion to the amount of advertising carried.

Before discussing the company's program for encouraging dealer tie-in advertising a few words will be in point in reference to the volume and diversity of P. G. and E. advertising.

Newspaper space of course carries a large share of the load, about $100,000 being allotted each year for gas appliance advertising in dailies and weeklies. Another $17,500 is allotted to billboard copy. Liberal use is made of truck banners, bill stickers and various forms of direct-by-mail. All-in-all, the P. G. and E. consumers—500,000 of them, in some 315 towns of northern and central California—are reached many times a year with a gas message.

In its copy treatment P. G. and E. consistently advertises a gas use, making no reference to price or trade name of equipment. This is in line with the general trend of the company's merchandising policy, which places the emphasis upon load-building and limits direct selling largely to major appliances.

In spite of its well-rounded advertising schedule the company has felt that dealers over its system were not securing the full benefits obtainable through properly aligning their advertising activities with those of the company. For the past three years, therefore, a carefully formulated program of "advertising advertising" to dealers has been conducted. In general the plan aims to carry complete information on current P. G. and E. advertising to dealers and build up the degree of individual dealer advertising run during each campaign. To the dealer advertising is left the job of supplying specific terms on definite merchandise.

Dealer Broadside

In spreading the tie-in idea the company is publishing a monthly dealer broadside. The first page consists of a letter from H. M. Crawford, general

(Continued on page 46)

Natural Gas As Sponge Iron Reductant

Summarizing a Series of Experiments Conducted by the Pacific Experiment Station, U. S. Bureau of Mines *

IN 1927 Williams, Barrett and Larsen published their comprehensive and historic report on The Production of Sponge Iron as Bureau of Mines Bulletin 270. Their work dealt largely with the use of solid fuels as reductant, and hydrocarbon gases were discussed in a few short paragraphs. The situation with respect to hydrocarbons was summarized by them as follows:

"The important fact, however, is that, at temperatures high enough for the rapid reduction of iron oxides, even methane tends to decompose almost completely into carbon and hydrogen; therefore C, CO, and H_2 are the agents actually entering into the reduction reactions. Data on these latter reducing agents should also apply where hydrocarbons are present, with the added factor of a fairly large absorption of heat through decomposition of the hydrocarbons, as discussed below in thermal calculations. The slow decomposition of methane indicates that it should be more inert as a reducing agent than its decomposition products."

The seven years which have elapsed since these statements were made have brought with them a new status of hydrocarbon gases as metallurgic reagent, and an economic factor not then apparent—the availability at a number of important western industrial and smelting centers of relatively cheap and abundant natural gas. Thus, the technical application of their method as, for example, when it was considered for introduction into the San Francisco Bay region shortly after the appearance of the Bulletin, had finally to be abandoned because of the relatively high cost of solid fuels and because of the inability of the solid-fuel reduction method to handle ores containing appreciable quantities of sulphur. Such ores, and in general, a similar economic situation, were the rule rather than the exception in Western States where workable iron ore reserves existed.

The present situation with ores is virtually unchanged, but Bureau of Mines engineers realized some two years ago that the advent of cheap natural gas might mean a possible solution of the major economic and technical difficulties in producing raw iron in the West, at least in certain favored localities.

There are theoretical physicochemical reasons why gaseous agents are ill suited for the reduction of liquid iron—iron oxide systems, and it is rumored that the research files of at least one important organization investigating this field have ample evidence that theory and practice are here in accord. For these reasons, it seems certain that any satisfactory process for the use of gaseous reductants would almost inevitably have to produce iron in the unmolten state—as, in fact, sponge iron.

The utilization of sponge iron so produced would have a number of powerful incentives. With the lowest cost of natural gas and ore, and with normal costs of pig iron and scrap kept locally at a rather high point by freight rates, as for example, in certain parts of the Pacific Coast, sponge iron might conceivably be produced at a cost to compete with the crudest form of raw iron. In fact, the ability so to compete is probably absolutely necessary for any successful sponge-iron development. Moreover, the actual attainment of such costs might render concentration of certain lower-grade ores economically feasible after reduction.

Further, in the prospect of treating very pure iron ores, special products of high purity for the direct production of ingot iron, direct wrought iron, or special steels might be economic even in those places where the lowest prices of gas were not available, largely because the gaseous reductants in general tend to purify the product, where solid reductants often contaminate.

Finally, sponge iron as a chemical reagent has a recognized and limited use, which, with a substantial lowering of cost of the sponge, may develop into applications of some magnitude. Thus, for example, it is reported that sponge iron has been used abroad for the hydrogenation of oils by a new process utilizing the action of steam on iron suspended in the oil to produce hydrogen in situ. In such use its advantages would seem to be a considerable saving in plant cost compared to older, direct hydrogenation processes, with possibly further technical gains in the purity of product produced.

Direct Production of Sponge Iron by Gas

Early in 1931, the recognition of the situation described above caused R. S. Dean, chief metallurgist of the Bureau of Mines, to obtain authorization for the Pacific Experiment Station to study in detail the fundamental reduction chemistry and thermodynamics of the utilization of natural gas for the production of sponge iron. It was clear that if the difficulties faced by Williams and his coworkers were to be overcome, it would only be possible through intensive study of the thermal and thermodynamic relationships involved.

Preliminary Experiments

In starting investigative work at Berkeley, it seems desirable to confirm experimentally the statements of Williams and his coworkers concerning methane reduction. Our original materials were pyrite cinder, and the local gas supply containing 83-84 per cent methane. With these materials, a series of small-scale laboratory tests showed that under the best conditions of temperature, gas flow, etc., reasonably complete reduction could be effected at 900° C in a 24-hour treatment time, and with a fairly reasonable efficiency of gas utilization. These

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By

C. G. MAIER†

and

S. B. THOMAS‡

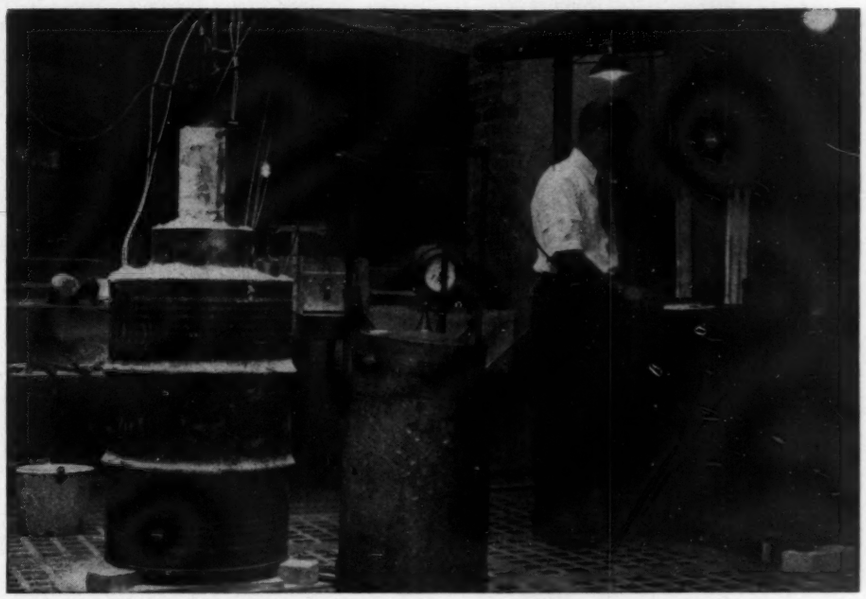

FIG. 1. Vertical 50-pound batch retort for direct production of sponge iron by gas. Also used for gas-air mixtures.

conditions naturally imply a very low rate of admission of gas, expressed as cubic feet per pound of iron per hour. Such conditions, while not commercially encouraging, might not be prohibitive, provided that large enough units could be built. The next step was obviously to determine the effect of increased size of apparatus.

For these tests, the electrically heated vertical retort shown in Fig. 1 was built, and operated on 50-60 pound batches of pyrite cinder. Its operation was disappointing from the point of view of production rate, since the time for reasonably complete reduction was increased to over 48 hours. The increased time of reduction compared to smaller-scale tests was traced to two factors. (1) nonuniformity of gas distribution in the granular bed of cinder, and (2) excessive thermal gradients in the bed of charge.

At a temperature of 900°, the reduction of ferrous oxide by methane may be written as follows:

$$0.45\ CH_4 + FeO = 0.145\ CO_2 + 0.305\ CO + 0.405\ H_2O + 0.495\ H_2 + Fe$$

and the heat absorbed in this reaction is calculated to be 28,300 calories for each 56 grams of iron produced. It can readily be shown, and the reader may take it for granted, that the stages of reduction of ferric oxide to ferroso-ferric oxide and ferroso-ferric oxide to ferrous oxide are relatively unimportant in their effect upon thermal requirements and gas-composition limits of the total reduction process. These first stages of reduction of the equivalent amount of oxide corresponding to the above reaction are readily brought about by a part only of the CO and H_2 remaining from the ferrous oxide reduction.

Both pyrite cinder and reduced sponge iron, as well as other ores of iron, are relatively poor conductors of heat, and this inherent property of the materials, together with the inevitable absorption of heat according to the reaction above, caused a drop of temperature of 50-100° between the walls and center of a 7-inch externally heated retort. It is very plain that the transmission of heat to complete the reduction reaction through retort walls and bed of charge involves such gradients as to preclude the operation of commercially sized retorts. If the external temperature is raised in a retort 12 to 14 inches in diameter to a point giving adequate reduction in the central core, the external surfaces must become so hot as to sinter the sponge and even fuse it tightly to the walls.

Use of Air-Gas Mixtures for Reduction

Patent literature contains a number of references to the use of air-gas mixtures for the reduction of ores, and the admission of limited quantities of air to furnish heat for the process is an obvious expedient in view of the recognition of the difficulties mentioned above. In the ideal case only sufficient air to convert the hydrocarbons to carbon monoxide and hydrogen would be indicated, since further increase would result in the formation of CO_2 and H_2O, which in turn would be harmful to the reduction efficiency of the gas. Study of the thermochemistry of such a process showed the total of the heats of reaction involved to be nearly zero, indicating that theoretically such a process might be nearly self-supporting.

Experiments were performed in the same apparatus as illustrated in Fig. 1. Limitations of space prohibit description of the many interesting tests made with this apparatus; the general results only will be recorded here. While the total treatment time by the air-admixture could be reduced to 12 hours for a 50-pound batch compared with 48 hours without air, very serious practical difficulties were soon encountered. Thus, considerable methane was always found in the exit gases, indicating that the methane-air reaction was slow, even when subject to the catalytic action of the reduced sponge-iron particles. Furthermore, instead of burning uniformly to CO and H_2 it was found that a part of the gas immediately burned to CO_2 and H_2O near the gas inlet, resulting in excessively high local temperatures here, whereas the subsequent reduction of the CO_2 and H_2O by the unburned excess methane took place slowly and was endothermic, so that sharp temperature gradients in the direction of gas flow now resulted, and heavy zoning action took place in the reduction of the charge.

After considerable experimental work the following important conclusions were reached concerning the use of air-methane mixtures:

1. Reduced sponge-iron particles are inadequately catalytic at safe operating temperatures (below 900°C).

2. The time of reduction is limited by the rate at which the methane may be converted to CO and H_2.

3. Exclusive of the heat required to bring ore and reductant to operating temperatures, the reduction may be made nearly adiabatic.

4. Combustion of methane (formation of CO_2 and H_2O) must

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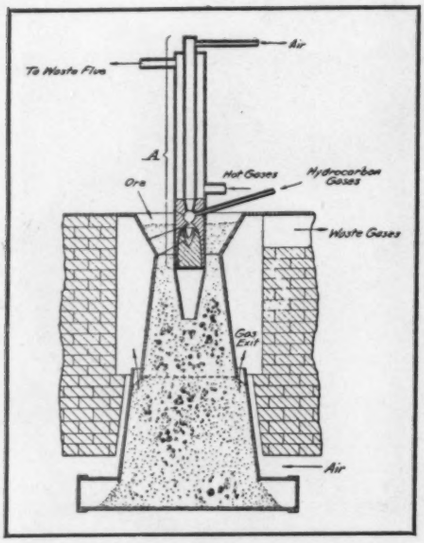


FIG. 2. Diagram of simplest application of catalytic gas converter to sponge-iron production. Suitable for hard, coarse ores.

be avoided both to prevent zoning and sintering and to limit reoxidation.

Indirect Production of Sponge Iron by Gas

Catalytic Conversion of CH_4-Air Mixtures

Formulation of the above conclusions indicated the solution of the thermal problems involved in the use of hydrocarbon gases for reducing iron to be the catalytic conversion of CH_4-air mixtures in a unit separate from the reducing furnace, where it would be possible to utilize a more efficient and more refractory catalytic material, preferably at a temperature slightly higher than the sintering temperature of sponge iron, and where it would be possible to preheat the air used.

The use of fused-alumina refractory mass granules impregnated with nickel for catalytic conversion of methane-steam or methane-CO_2 mixtures was well known to the art, and experiments were started on the catalytic conversion of gas-air mixtures in a catalytic mass of this sort. It was soon apparent that these granules would safely withstand a temperature of 1,050-1,100° C without deterioration of catalytic activity, but nevertheless the same zoning action occurred in the new catalyst as in the reduced iron ore bed, as represented and caused by the consecutive reactions:

1. $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$
2. $CO_2 + 2H_2O + 3CH_4 \longrightarrow 4CO + 8H_2$

After many expedients to avoid these difficulties were tried without success, the solution was finally found in the special design and careful control of a catalytic converter. The successful process utilized the following principles:

1. The hydrocarbon gas and air preheated to 1,000° C are mixed with extreme rapidity and very thoroughly under such conditions that no flame can be produced.

2. The mixed gases are contacted with a bed of catalytic material of gradually increasing cross-section in the direction of gas flow, the initial contact being made at a rate exceeding the rate of flame propagation for the compositions and temperatures in question. The regions of the first step or zone of the reaction are thus decentralized and brought into proximity and virtual identity with the region of the second zone.

3. Specially shaped refractory masses, serving to guide the flow of gases in the catalyst bed, are so disposed as to further dissipate the heat to a uniform condition.

The control of such an apparatus becomes quite simple, as it only is necessary to maintain the proper flow of gas and air and the right degree of air preheat. The ultimate life of the catalyst has not been determined, but a unit has recently been in continuous operation for six weeks without showing appreciable change of catalytic activity.

TABLE NO. 1
COMPOSITION OF REFORMED GAS

Constituent	Using Natural Gas, 83-85% CH_4	Using Commercial Butane
CH_4	0.4%	0.3%
CO_2	0.8	0.4
CO	19.0	22.2
H_2	36.5	30.0
H_2O	0.9	0.4
N_2	42.4	46.7

One important factor of the new design is the completeness of conversion and the relatively low H_2O and CO_2 contents of the gas produced. These items are of great importance when the resulting gas is to be used for metallurgical purposes, and especially for those involving the reduction of moderately stable oxides. Table No. 1 shows typical gas analyses produced by the converter.

When a gas of composition similar to those given in the tables is used for reducing iron oxide, the need for low CO_2 and H_2O becomes apparent. Chemical equilibria conditions in the reduction of FeO to Fe at 900°C, require a ratio of

$$\frac{CO_2}{CO} = 0.466, \text{ and } \frac{H_2O}{H_2} = 0.822;$$

whence, in the absence of original CO_2 or H_2O 0.318 parts of the original CO, and 0.451 parts of the original H_2 may be utilized before equilibrium, and stoppage of reduction, is reached. Thus a gas containing 20 per cent CO and 35 per cent H_2 could utilize for reduction 6.36 per cent CO and 14.0 per cent H_2, and these figures also represent the limiting upper concentrations of CO_2 and H_2O. If the gas as made contains several per cent CO_2 and H_2O the corresponding decrease of utilization represented by the ratio between the original CO_2 and H_2O and the limiting percentages becomes a serious loss.

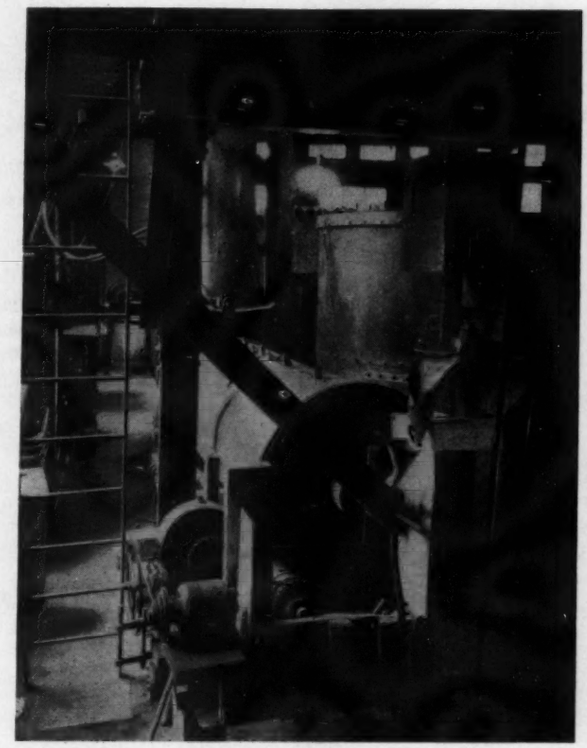
Direct Utilization of Reformed Gas for Sponge Iron

In a properly designed catalytic converter for gas air mixtures the time of residence of gas need only be a fraction of a second, whence the volume of gas produced by a given converter per unit volume of catalyst and per unit time is very high. Because of these conditions the simplest application of the converter consists in submerging it in a body of iron ore, preheated to the proper temperature, in a vertical furnace. A number of such units were built and operated, their general design being illustrated by the sketch shown in Fig 2.

Units of this type, which were tested on a scale involving an ore burden of about 150 pounds, showed that the catalytic converter bed cut reduction time from the previous 24-48 hours using

TABLE NO. 2. TYPICAL REDUCTION TESTS OF 6-FOOT BY 7-INCH ROTARY KILN USING CONVERTED BUTANE GAS

Ore	Kiln Temp. °C	Iron Content of feed lbs. per hr.	Maximum Iron Reducible by Gas used lbs. per hr.	Grade of Sponge % Fe Metallized	% of Reducing Gas Utilized
Limonite −4 +35 mesh	850	9.3	11.3	97	79
Eastern Hematite −6 mesh, few fines	850	9.5	11.3	95	80
Specular Hematite −8 +40	950	5.7	9.1	96	60
California Hematite −6 +40	950	4.9	9.1	85	54
High Iron Pyrite Cinder, −4 +26	800	5.9	9.1	90	58
Medium Iron Pyrite Cinder, −4 +26	830	5.8	9.1	90	57



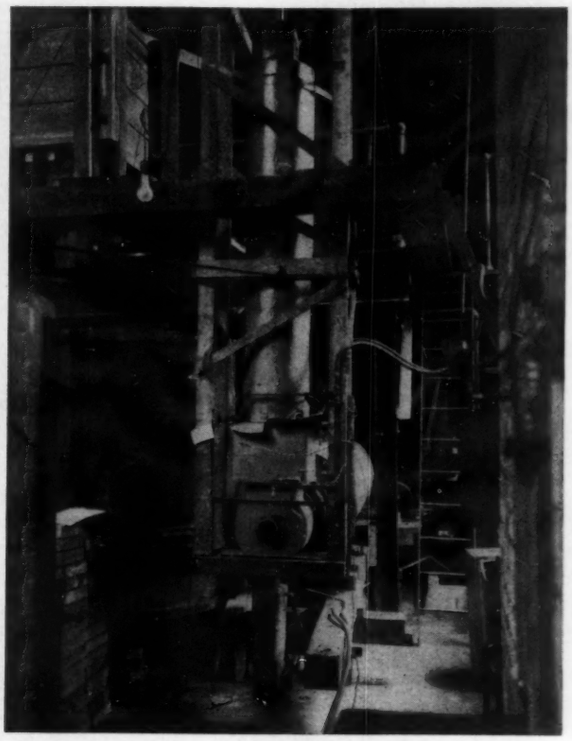


FIG. 3. (Left) Rotary kiln for reducing sponge iron by converted gas, at the ore feed end. FIG. 4. (Right) Rotary kiln for reducing sponge iron at the gas converter end. The unit had a capacity of about 200 pounds iron per day.

air-gas mixtures directly, to 3-4 hours when using the catalyst. The use of the catalyst in this manner thus constituted the first really definite intimation of commercially attractive reduction rates when using hydrocarbon gases. Nevertheless, when this type of furnace was utilized for the softer iron oxide materials, such as pyrite cinder, serious mechanical difficulties were encountered due to the sticking of the charge. During the course of the reduction the particles of partly reduced sponge sintered together with solid, though loosely bonded, masses interspersed with long cracks through which the reducing gases flowed instead of uniformly penetrating the charge. The charge also stuck to the alloy-steel furnace walls, and barring the charge only welded it more tightly.

Because of these factors, satisfactory throughput and reductions could not be obtained on pyrite cinder with this furnace. Had there been available at this time the extraneous solution of the sticking problem which was later worked out, this furnace might have worked satisfactorily for the coarser grades of pyrite cinder. As it is, its simplicity and low cost recommend it for coarse, hard ores, which can be reduced without serious sticking. It was clear, however, that for the finer, softer ores the converter must be coupled to a type of reducing unit radically different from a shaft furnace.

Application of the Gas Converter to a Rotary Kiln

At this period of our work, it had been demonstrated that the specially designed gas converter gave a means of producing gas capable of reducing ore particles up to ¼ or ⅜ inch size in about 3 hours, and that if the ore and gas could be brought into contact when preheated very little further heat was required to complete the reduction to iron.

Proceeding upon more or less conventional metallurgical lines the adaptation of a rotary-kiln reducing unit seemed indicated; because of the special requirements involved, the resultant kiln, turned out to be of rather unconventional type. Because of the relatively low maximum temperatures (below 1,000°C) required to produce sponge iron from most ores and converted gas of the above-mentioned composition the use of alloy steels of chromium and nickel becomes thoroughly practical and advantageous, and the feasibility of adapting the kiln-type unit to our requirements is predicated upon this possibility.

Based upon a combination of a number of features borrowed from previous attempts to produce sponge iron, a kiln unit some 6 feet long and 7 to 8 inches internal diameter was constructed of 10-gauge ascaloy 44. Axially through the center a fire tube of the same material enabled us to supply the small quantities of heat needed for the completed reduction, using converter gas at 1,000°C. A special type of gastight seal at the "head" end was devised to connect the vertically disposed catalytic converter to the kiln, substantially without temperature drop in the gases. This end is also the discharge end for sponge iron, which dropping from the annular space into a water cooled can is cooled in fresh converter gas, and thus prevented from reoxidation.

The kiln was constructed without refractory lining, which not only greatly decreased the weight of the kiln structure, but also avoided the slagging action of ferrous oxide on ordinary refractories. Because of the high thermal expansiveness of alloy steels, the kiln tubes are "floating" and anchored only at the head end. Light weight thermal insulation about 1 foot thick conserves the heat of the kiln, and permits the entire kiln structure to be fabricated from small structural shapes, with a light gauge sheet iron cover. Figs. 3 and 4 show views of the kiln as constructed.

In this small kiln an extensive series of tests were run upon a variety of ores of various types. In Table No. 2 some typical results are given. These figures have been selected from a considerable accumulation of data obtained under

(Continued on Page 38)

DISTRIBUTION

Maintenance of Service and House Piping

• ROBERT H. TAYLOR, gas engineer, Public Service Co. of Colorado, Denver, Colo.; addressing A. G. A. Eleventh Annual Distribution Conference, Detroit, Mich., April 9, 1934, topic "Maintaining Installations"—(Abstract):

IN Denver the gas operating department consists of three divisions: Production, formed of natural gas measurement engineers and clerks; Distribution, organized to transmit gas from the purchasing point to the consumers' premises, and divided into Gas Stations group that operates holders, regulators and other pressure controls, and Street Department that constructs, operates and maintains all mains; Utilization, responsible for the utilization of gas on the customers' premises, and divided into Gas Meter Shop for testing and repairing meters and regulators, and Fitting Shop, which sets, changes and returns all meters and house governors, runs house piping, installs all gas appliances sold by the company, connects other appliances on order, and services all gas appliances, piping and equipment on the customers' premises. This paper deals with the Fitting Shop's activities. In response to poor pressure and leak complaints, etc., practice is as follows:

Cleaning Services of Stoppages: Appliances are first checked to see that inadequate gas supply, and not the appliance, is at fault. Service tee plug is then removed and, if stoppage is found, service is blown by portable air tank, as shown in Fig. 1. (This tank is filled each morning from the shop air line, to 85 lbs. pressure and, if used during the day, is refilled at the nearest gasoline service station. The free air capacity is slightly less than 1 cubic foot.) This air tank invariably removes napthalene (now rarely encountered), generally removes water (with the assistance of alcohol blown into the line when frozen), and removes more than half of the rust stoppages. When the rust accumulations resist this blowing, the service is dug up by the Street Department.

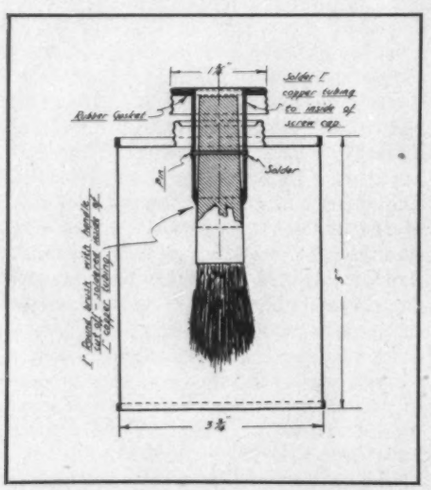


FIG. 1. Air tank for blowing gas services.

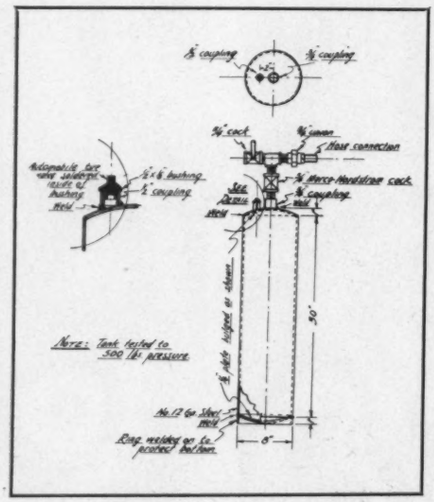


FIG. 2. Soap can for gas fitting shop.

Clearing House Pipes and Fuel Lines of Stoppages: This is done after it is found that the service, meter and regulator are not at fault. Owner is advised that pressure blowing has to be resorted to which may make stoppage more complete and necessitate dismantling; if piping is concealed owner is asked to sign a printed form relieving the company from expense and responsibility in the event that pipe becomes plugged and entirely unserviceable. If portable air tank is insufficient a compressor is sent for; if line still remains plugged it must be torn down length-for-length at owner's expense. The company will do this work, if authorized, on a labor-and-material cost basis, handled as a rush order and completed as soon as possible.

Repairing Leaks in Fuel Lines and House Piping: Usually, if the trouble man can make the repair without additional help and using material which he has with him or in his truck, and the time required will not exceed an hour, he does the work without charge. Where the correction will require extra material or several hours' labor the work is handled on a charge basis. Soap suds are used to disclose leaks, and a specially developed kit is carried for this purpose, with details as shown in Fig. 2. The can is made of heavy tinned plate. The round sash brushes are 1 inch in diameter with handles cut off, riveted in a short piece of copper tubing, and the tubing finally soldered into the screw cap. Capacity of the can is about 1 pint. Experience has shown that only the better grades of liquid soap should be used, which can be diluted half-and-half with water, and will produce lasting suds.

Operating a Group of Widely-Scattered Distribution Systems

• CHESTER L. MAY, Lone Star Gas System, Dallas, Texas; addressing 11th Annual A.G.A. Distribution Conference, Detroit, Mich., April 9, 1934; topic "Organization and Operation of Numerous Distribution Systems Scattered over a Wide Area but in a Unified System"—(Abstract):

THE rapid expansion of the natural gas industry into new territories in the last 15 years, and especially into hundreds of small towns and communities operating as a unified system, particularly in the Southwest, has presented an entirely new set of management and operating difficulties. The organization and operation of numerous distribution systems scattered over a wide area develops peculiar situations, and problems entirely different from those of a city distribution plant. Organization and operating policies for one such system consisting of more than 250 distribution plants serving communities, towns and cities from 100 to 15,000 meters each, and serving a total of 135,000 customers scattered over a territory twice the area of the State of Michigan, are dealt with in this paper. Fig. 1 shows an organization chart for this system.

Chester L. May

Under two general superintendents, the system is organized into divisions of

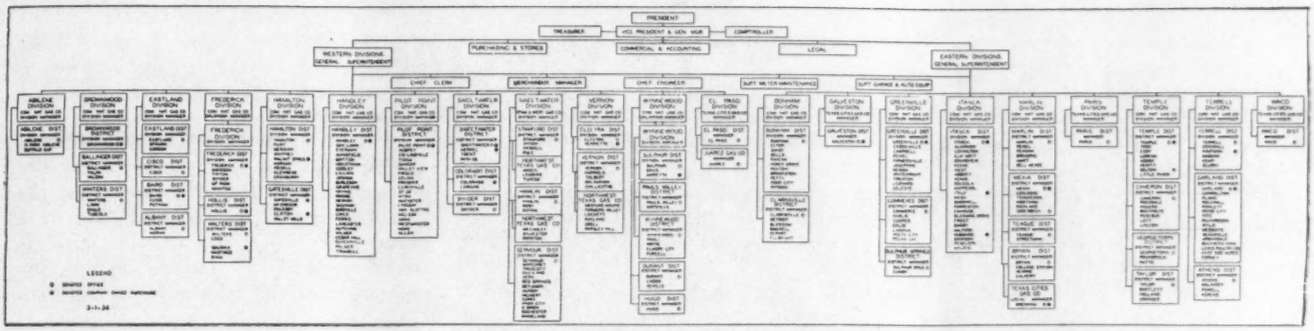


FIG. 1.

approximately 10,000 meters each; these are subdivided into districts of 1,000 to 2,500 meters, some districts consisting of several small towns.

A centrally located general office carries the control and supervision of the various departments and activities. Due to distances involved, it is necessary to carry on the major part of the supervision by correspondence; uniform operation and policies are greatly assisted by an "Operating Manual"; general superintendents and other key men do considerable traveling to maintain as much personal contact as possible.

Customer billing is centralized in the general office for all towns having less than 10,000 accounts. Audits are made by specially trained traveling auditors, including district traveling meter auditors. Meter readers are changed every other month, as a precaution and automatic check on readings.

One central stores department is maintained, with general purchasing agent, but division managers make local purchases where prices are comparable and public relations assisted.

Considerable attention is paid to developing detailed engineering data and accurate maps and records; also careful measurement checks so that leakage can be rapidly discovered.

One of the greatest problems is the economical utilization of widely scattered power equipment, high pressure regulators and large capacity meters. This is greatly assisted by establishment of combined central meter-regulator repair shop, machine shop, and garage, which permits rebuilding and reconditioning of used equipment and assignment of same to districts where it can be best used; a traveling automobile inspector works out of this shop—also traveling meter, regulator and instrument repair men.

All employees are expected to be salesminded as well as proficient in their specific duties. During sales promotional activities the same type of appliance is featured throughout the system. All salesmen are employed on a straight salary basis.

Traveling crews of "home service engineers" adjust and condition customers' equipment. All domestic appliances are adjusted periodically, whether or not complaints have been received; commercial and industrial equipment is inspected and adjusted at least once a month. The advertising department includes a home economics director for cooking demonstrations and a traveling window and floor display specialist.

Classes in appliance adjusting, installing, selling, proper application of the fuel, proper customer contact, safety methods, company policies, etc. are held weekly in each division.

The design of the distributing system has much to do with economy of operation in the type of property discussed above. A low pressure system with curb box meters is, in the writer's opinion, best suited to the needs of the company and its customers. The low pressure system provides a minimum of unaccounted-for gas and allows lower operating and maintenance expense. Curb meters make an ideal installation, particularly in the southern and southwestern states due to prevailing climatic conditions. They are always accessible for reading and removing, and by-passing is practically impossible. The company is relieved of testing consumer's yardlines for leakage, and loss from this source is eliminated. Responsibility of the company in case of explosion or fire on the consumer's premises also is remote. Less damage is done to the meter itself and meter repair bills are lower. As each customer has a separate yard line, a more uniform service is rendered.

New Tests and Design For Gaskets

● **GEORGE H. PFEFFERLE, chief engineer, S. R. Dresser Mfg. Co., Bradford, Pa.; addressing Eleventh Annual A. G. A. Distribution Conference, Detroit, Mich., April 9, 1934; topic "The Distribution of Gasket Pressures in Pipe Joints and Clamps"—(Abstract):**

THE design of all mechanical pipe joints and clamps using gaskets under compression is based upon the fundamental principle that the unit gasket pressure must always exceed the line pressure in order to prevent leakage. Thus, the ratio of the gasket pressure to the line pressure represents the factor of safety of the joint. If there is any variation in the gasket pressure, the minimum must be used in arriving at the factor of safety. It is very important, therefore, to ascertain the distribution of the pressure which gaskets exert against the pipe before the effectiveness of various pipe joints can be accurately determined. These determinations suggest improvements and the same method can be used to evaluate the improvements after they have been made.

Heretofore tests have consisted in assuming that unit pressure is equal to evenly distributed total pressure, taking no cognizance of low and high pressure areas; by observing the impressions made in a strip of lead placed between a rubber gasket and a specially prepared pipe with a grooved surface, permitting gasket flow and therefore relief of pressure, and giving no evidence of reduction of pressure with time; by applying pressure to a crosshatched section of rubber gasket in a glass-faced fixture, which shows only distortion and flow, and not pressure exerted.

After considerable experimental work an entirely new and extremely accurate gasket pressure gauge was developed. This instrument is not only free from all the objections to previous methods but is also much more versatile. The principle of operation of this gauge is to measure the force exerted by the gasket upon the end of a "pressure pin" having an area of exactly 1/100 sq. in. These pressure pins are accurately fitted in carefully reamed holes at any desired point in the test specimen and are adjusted

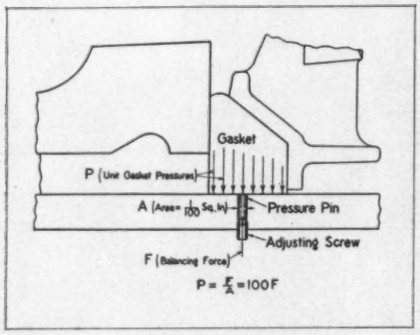


Fig. 1. Balanced-pressure method of accurately measuring gasket pressures at any point and after any interval of time.

to bring the ends of the pins absolutely flush with the surface contacting the gasket. A specimen prepared in this manner has packing surfaces substantially the same as in a field joint, and the behavior of the gasket is not altered in any way.

After the gasket is compressed, the pressure acting upon each pin is measured by applying an opposing force until a balance is obtained and a minute displacement of the pin occurs. By means of a special vacuum-tube circuit the movement of the pin is limited to a few millionths of an inch, thus reducing the error due to displacement to a negligible value. A greatly enlarged cross-section of one of the pressure pins illustrating the principle of operation is shown in Fig. 1. The actual diameter of these pins is only .1128 inches and they can be spaced as closely as 1/8 inch apart.

This method and apparatus has been refined to such a degree that one observer can read and record pressures at the rate of about 150 readings per hour; readings can be taken during the assembly of a pipe joint and at any interval of time thereafter; it is possible also to take them with the joint under line pressure. The gauge is not affected by such factors as condition of pipe or bloom on gaskets.

The first application was in tests on bell joint clamps, as it was felt that they afforded the greatest opportunity for improvement. Fig. 2 is a typical chart made from a series of readings. A progressive re-design of this clamp finally gave a chart that was almost a perfect circle.

By using a specially developed wrench that gives a measured torque to bolts, the comparative gasket compression efficiency of various joints can be measured.

Various samples of rubber compressed between two steel plates equipped with this new testing device gave the following information:

Some grades of rubber show a considerably higher initial pressure than others; there is a pronounced decrease in pressure during the first few days of the test; after a comparatively short period of time some grades of rubber show practically no change in pressure, while others continue to decrease slightly.

Typical results from a series of extended time tests showed that practically the entire change in gasket pressure took place in the first 21 days, and that by the time 406 days had been reached the pressure had become constant.

Time tests on mechanical joints have indicated that in certain types of joints and under certain conditions there is a somewhat greater reduction in gasket pressure than in some bell joint clamps. The discovery of this fact has led to the development of a new gasket construction in which the packing material is completely confined.

The essential feature of the new gasket is a metallic armor in the form of a closely coiled helix which is practically indestructible and yet as flexible as the gasket material itself. Transversely a helix has a very high modulus of elasticity which makes it an excellent "dam" to prevent flow of the gasket into the clearance spaces. In an axial direction the modulus of the helix is about the same as that of rubber permitting it to conform readily to variations in the diameter and contour of the pipe. The helical armor protects the gasket from condensates because there is practically no separation of the coils even when the gasket is stretched. For example, if a gasket for 12¾ in. O. D. pipe is stretched over a 13 in. O. D. pipe, the separation of the coils will be less than

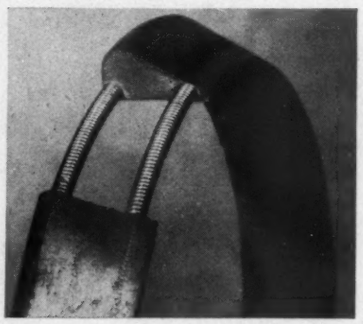


Fig. 3. Cut-away view of new gasket, showing flexible metallic armor at tip and heel to prevent flow and chemical attack.

1/1000 of an inch. The armor may be made in several different cross sections, and from a variety of materials, and may either be incorporated in the gasket or used as a separate member. Fig. 3 is a coupling gasket having an armor moulded in both the tip and heel. A portion of the gasket is cut away to expose the armor, which, in this case, is made of steel and has a circular cross-section.

Gaskets of this type have been tested in a pipe line filled with drip oil under 250 lbs. pressure, and after one year showed absolutely no deterioration of the rubber behind the armor. Accelerated tests on plain and armored gaskets, made of an ordinary grade of rubber having very little resistance to drip oil, indicate that the armor will continue to protect the rubber indefinitely under the most severe conditions.

Armored gaskets have also been subjected to longitudinal movement tests in comparison with lead-tipped gaskets installed in the same joint. In this case the new type gasket was armored at the tip only, and unlike the gasket shown in Fig. 3, had no rubber beyond the armor. The lead tip, being plastic, flowed considerably in this test but remained unbroken and still provided adequate protection against condensates. The armored gasket was not damaged in any way.

The new gasket is particularly useful when excessive clearances are encountered because the armor positively prevents gasket flow.

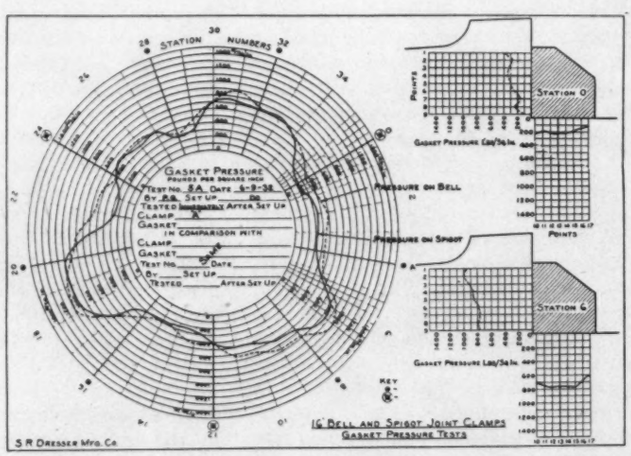


Fig. 2. Distribution of gasket pressures in bell joint clamp "A", showing unexpected variations but satisfactory minimum pressure.

PLANT PRACTICE

Gas Mixing Experience on Mid-West Systems

● J. A. PERRY, United Gas Improvement Co., Philadelphia; addressing Mid-West Gas Association, Sioux City, Iowa, April 16, 1934; topic "The Mixing of Natural and Manufactured Gases and the Replacement of Natural Gas by Manufactured Gas"—(Abstract):

THE advent of natural gas in large quantities through long pipe lines has brought to the fore a number of problems in gas mixing. The old problem of augmenting the peak load is not only present, but there also is the problem of temporary supply of substitute gas of satisfactory characteristics for the complete replacement of natural gas.

Some companies are using natural gas for enrichment of blue gas; others for topping coal gas and carburetted water gas to a higher B.t.u. standard.

The simplest mixing problem in the Mid-West territory is:

(1) That of replacing oil as an enricher for carburetted water gas of 520 to 580 B.t.u., with natural gas.

The next in order of simplicity are:

(2) The topping up of either carburetted water gas or coal gas, or a mixture of the two, to a higher B.t.u. Maintaining the supply of this high B.t.u. gas under all load conditions, including the entire replacement, in an emergency, of the natural gas normally used in the mixture, and

(3) the supply of straight natural gas, with its augmentation to any reasonable amount and its complete replacement if necessary by standby plants.

For the replacement of oil as an enricher it is generally possible through the use of the blow run or producer gas to increase the gravity of the gas and still have the burning characteristics such that very few adjustments to appliances will be necessary, and if for any reason the supply of natural gas is interrupted, the usual carburetted water gas of the same B.t.u. can be substituted.

For one situation distributing a 600 B.t.u. gas and contemplating enriching with natural gas, a study and tests were made with the result that recommendation was made for use of some blow run, the production of a 400 B.t.u. oil-enriched carburetted water gas, and the cold enrichment of this gas with natural gas to 600 B.t.u., thus permitting the mixed gas to be made just as cheaply as for cold enrichment of a 280 B.t.u. blue gas with natural gas to 600 B.t.u., and saving the gas company the expense of making any appliance adjustments except upon request of the customer. In an emergency, the usual 600 B.t.u. carburetted water gas or a lower B.t.u. carburetted water gas enriched with butane could be used should the supply of natural gas fail.

For another situation sending out a mixed carburetted water gas and coal gas and wishing to continue a 530 B.t.u. standard, it was possible, through the use of some blow run, to provide a substitute blue producer and natural gas to replace the mixed gas and avoid appliance adjustments; also, to work out the use of butane to replace the natural gas enrichment or, as an alternative, a low gravity carburetted water gas.

For one situation where a straight 530 B.t.u. coal gas was in use, means were found to substitute a 570 B.t.u. carburetted water gas while the coal gas plant was out of commission for rebuilding.

One other problem was a change-over where it was desired to use natural gas to a large extent, but to keep intact and use about one-half of the existing coal gas plant on the base load. This finally resulted in an 875 B.t.u. mixture, containing about 25 per cent of coal and producer gas of 530 B.t.u. Tests showed that in this particular case, in an emergency, the natural gas in the mixture could be increased until the B.t.u. of the mixed gas approximated 925; also that through the use of butane and the storage holders, a 24-hour interruption of the supply of natural gas could be handled. Other possibilities were the future use of a carburetted water gas plant for the base load and also for the production of a suitable 875 B.t.u. gas through the use of the Willien and Stein low gravity gas process together with butane for emergency supply for the entire load should the supply of natural gas be interrupted. The use of a 400 B.t.u. reformed natural gas by the U.G.I. process to be topped up with natural gas to 875 was found to be feasible and economical for summer and other light load conditions where the daily demand for natural gas falls within the contract demand.

Recently it became desirable to find out just what could be produced on a carburetted water gas set in the way of a high B.t.u. gas for replacing refinery oil gas in case of an interruption.

There are many advantages when using carburetted water gas in retaining and using coke or other suitable fuel in the generator, as a source of heat for gasifying gas oil and as a source of gas production for blue gas, producer gas, and reformed oil gas (Willien and Stein process) so as to be able to vary the B.t.u. quality of the finished gas, its chemical composition and its gravity.

From the tests it now appears possible to make, with the use of coke and/or other suitable generator fuel, and a good gas oil, a thoroughly satisfactory gas of 1000 to 1150 B.t.u. quality for the purpose of augmenting the supply of natural gas of the same quality.

It is estimated that holding the substitute gas to approximately 1030 B.t.u. will, in the advent of a complete switch, give satisfactory performance on from 70 to 90 per cent of the burners in use.

It was found that this 1030 B.t.u. manufactured gas could be added up to 40 per cent with gradual hardening of all blue flame burners. On the yellow flame burners tested the operation was satisfactory. It is probable that through reforming some of the oil gas in the generator fire the mixture of this modified 1030 B.t.u. gas up to 50 per cent with natural gas would be satisfactory.

It was also decided to check up the A.G.A. tests where it was reported that a mixture of coke oven gas and butane of .74 gravity and 1120 B.t.u. quality was completely and satisfactorily interchangeable with a 1120 B.t.u. .66 gravity natural gas. Especially interesting was the performance on the yellow flame burners. Results showed that our particular mixture of 1030 B.t.u. coal gas plus butane and of .702 gravity would completely switch with the 1030 B.t.u. natural gas of .687 gravity. It was found, however, that the butane used consisted of approximately 40 per cent propane and 60 per cent butane. This particular butane-enriched gas was judged to just about pass in performance considering all of the appliances tested.

Assuming an average natural gas of 1030 B.t.u. and .69 gravity in general use in the Mid-West states, it is possible to produce a manufactured gas of 1030 B.t.u. with a gravity ranging from .70 to .80. Keeping the gravity up sufficiently premits reducing the B.t.u. flow through the orifices so as to have sufficient primary air to secure the proper combustion of the illuminants of the substitute gas in the blue flame burners.

From the tests made a production is estimated of from 3,000 M to 4,000 M per day of 1030 B.t.u. gas on a standard 11-foot U.G.I. set, the capacity depending upon how up to date are the blowers, connections, wash-boxes, etc. The changes necessary are inexpensive, the most expensive item being perhaps in some instances the replacement of exist-

ing old style automatic controlling apparatus with new apparatus having the requisite number of controlling cams.

Operations on a continuous test show that it will be just as easy to produce a 1000 to 1100 B.t.u. gas as to produce a 530 B.t.u. gas. The heats and other operating conditions were easily and uniformly maintained.

It would appear that a 1030 B.t.u. gas can be made with about 23 lbs. of coke and 11.25 gallons of gas oil per M. The tar will approximate about 20 per cent of the oil used.

UTILIZATION

Modern Improvements In Customers' Appliances

• R. B. HARPER, vice-president, Peoples Gas Light and Coke Co., Chicago; addressing 29th Annual Convention of Mid-West Gas Association, Sioux City, Iowa, April 16, 1934—(Abstract):

WHEN Bunsen discovered, in about the year 1855, the principle of the Bunsen or non-luminous flame, the gas industry was placed in a position to embark into other fields than lighting. It was not until about 30 years later, however, that any appreciable utilization was made of this discovery. At this time the development of the incandescent electric lamp, by Edison, seriously and immediately threatened the gas lighting load, and provided the needed stimulus for the rapid improvement of appliances and more diversified use of gas.

R. B. Harper

The great improvement in utilization during the last 50 years is due to the decrease in cost, and increase in value, of gas to the consumer. While operating utilities may still further promote this improvement by reducing service costs, the vital responsibility falls on the shoulders of appliance manufacturers to design and re-design utilization equipment to make possible the fullest value to the customer.

Improvement in appliances has been very marked during the past three years, the gas industry apparently realizing that the development of appliances must lead and not lag behind the demand for better equipment.

The present trend in the manufacture of gas ranges indicates substantial changes in design in an effort to obtain more useful, efficient and modern appliances. Top burners are assuming a variety of new forms; new materials are being used, attention is given to designs that prevent stoppage of ports by boiled-over foods, and burners are being moved closer to cooking surfaces so as to increase efficiencies; ignition is facilitated, combination simmer and full burners are provided, and special cocks with latching mechanisms and step or graduated flow control are appearing. It is estimated that, on the average, cooking may now be done on the top sections of the most modern gas ranges at from 25 to 30 per cent greater efficiency than formerly. Control, insulation, and operating convenience of ovens and broilers have been greatly improved. External appearance has been considerably enhanced and modernized.

In the field of water heaters, convenience and safety have been attained to a great degree by widespread use of control and safety devices, such as thermostatic pilots, pressure and temperature relief valves and automatic shut-offs. Thermostats are almost invariably supplied, insulation has been improved, and a variety of designs makes it possible to suit the needs of every class of customer. Appearance has been given some attention and blends with basement room decoration.

Developments have been less marked in other types of appliances. In space heater design, most of the recent improvements have centered about external appearance. In the central heating field, radical re-design is making an appearance, with a pronounced leaning toward complete automatic control, and considerable activity toward the addition of air-conditioning equipment. Finally, progress in the design of the conversion burner has contributed its share to the sum total of modern improvements, with the application of special radiants, thermostatic pilots, carefully designed heating elements and correct secondary air flow to the flames.

In the commercial field, hotel and restaurant ranges have been modernized with respect to external appearance, the radiant surface broiler has gained considerable favor, and oven re-design has followed the discovery that convected heat is better than radiant heat for practically all baking processes.

In the industrial application of gas, research has been an important factor in developing:

1. the short-cycle malleablizing of cast irons with gas fuels at reduced process times and expense,
2. a finer and cheaper direct, continuous carburizing of steel with gas as a fuel,
3. the direct firing of high-quality chinaware and glazes, thereby reducing expense and cutting firing time as much as 75 per cent,
4. the application of gas heat to forging without troublesome scaling.
5. higher levels of bright annealing and nitriding with gas as a fuel,
6. the development of gas immersion burners for heating stereotype metal and zinc-base die casting metal,
7. considerable abatement of noisiness in industrial gas installations,
8. more accurate and economical usage of preheated air for saving gas, and
9. a better understanding of the fundamental practical relationships involved in the high temperature combustion of gas and in furnace design.

Flues, Chimneys, Venting, For Gas Appliances

• FRANK A. ENGEL, Supt. of Distribution, Elizabethtown Consolidated Gas Co., Elizabeth, N. J.; addressing New Jersey Gas Association, March 23, 1934; topic "Venting Gas Appliances"—(Abstract):

DEFINITION: The flue is the connection between the appliance and the chimney; the chimney is the vertical conductor which extends up through the building from the flue pipe to the outside atmosphere; when a chimney has several vertical risers these are called chimney flues.

It is desirable to vent gas appliances to remove combustion products, water vapor and excess heat; to remove cooking odors from a range; to create air changes and ventilation in a room warmed by space heaters; to provide safety for automatic appliances that might be subject to pilot failure and are not equipped with automatic shut-offs. Flue connection cannot be detrimental to operation if effective chimney is provided and suitable back draft diverter or draft check installed.

A satisfactory flue pipe should not be more than 20 feet in length horizontally,

constructed of corrosion resisting material, securely made up at joints, and properly supported to give rise of ¼-inch to 1-inch per foot, depending on length. It should not be trapped, should be straight as possible with few fittings, no smaller than flue collar of appliance nor larger than the next size above. It should not extend beyond the inner lining of the chimney, and the length of horizontal run should never exceed the vertical height of the chimney. Suggested materials, other than the ordinary iron or galvanized iron in common usage, are Alleghany metal, Monel metal, Everdur, copper and moulded asbestos.

A good and effective chimney will have the following qualifications: It should preferably be built entirely within the walls of the house. It should extend above the highest point of the roof by 2 feet. It should be lined from top to bottom with No. 1 glazed tile pipe with the bells facing upward and joints well made. No open joints should be allowed and all offsets should be made with proper fittings. A cleanout door should be installed at the bottom. The bottom of the chimney should rest on a solid foundation. The flue pipe should not enter on the very bottom of the chimney. Walls of chimney should be not less than 4 inches thick inside building or 8 inches outside of building. There should be a minimum number of offsets in the chimney. It is advisable to have the wall "furred out" around the chimney to prevent plaster cracks and paper discoloration. In any case the chimney should be lined whether as listed above or with ordinary chimney liner. If no lining exists, it may be lined with copper flue pipe or lead pipe; or if it is an outside chimney, it may be stripped from the outside and lined with salt glazed or vitrified tile pipe.

A simple rule of thumb for calculating necessary chimney flue area is to have 1 square inch of chimney for every 7,500 B.t.u. of input to the appliance.

If the chimney is not conveniently located, or in the absence of any chimney, use may be made of suction or discharge fans, or exposed chimneys of such materials as moulded asbestos can be installed. It is felt, however, that the most satisfactory solution to flue connection is a standard chimney for the kitchen and cellar. The whole matter goes back to proper cooperation with the architect when the house or building is being built. Architects must be kept sold on gas and must be given every possible aid to help them lay out homes which can use gas properly.

Hutchinson Gas Co. Gets Franchise

The Hutchinson (Kans.) Gas Co. has been granted a 20-year franchise by the city council of South Hutchinson, to extend its Hutchinson distribution system to the community.

LOAD-BUILDING

Adjusting Rates for Fluctuating Oil Prices

● **H. E. RANDALL, United Gas System, Houston, Texas; addressing the Southern-Southwestern Regional Gas Sales Conference; topic "Present Day Industrial Developments"—(Abstract):**

THE United Gas System, operating numerous natural gas distributing properties in Southern and Southwestern states, has been faced with oil competition of the most intense sort. Many small topping plants, primarily interested in cracking off the gasoline content of the crude, have offered the fuel oil residue at prices down to 10 cents per barrel and even have given away fuel oil in order to provide storage for incoming crude.

Two choices were open to United Gas System to hold its industrial load; first, to set up industrial rates at a definite competitive level and stay with them until forced to downward revisions; or, second, to design industrial rates to automatically meet the fluctuating levels of competitive oil prices. It was determined to follow the latter course.

Three distinct base rates were set up, to approximate the competitive bases of tank wagon, tank car, and extremely large fuel oil deliveries, since oil sales terms were divided sharply into these classifications.

Oil prices were checked over a period of years and an average fuel oil price in the company's territory of $1 per barrel was arrived at as the base price to be met by the new rates.

To the base industrial rates was added a 10 per cent differential, since past experience indicated that natural gas could command at least this figure over fuel oil due to its superior convenience values.

Having set up its base rates the company next studied the location of large refineries in its territory and determined the delivered price of fuel oil, dividing its territory into rate divisions corresponding to these findings.

The fuel oil clause in all three rate schedules was worded the same for a given rate area. All three schedules were of the promotional rate class. As an example of how the adjustment feature of the rates operates, in the Gulf Coast area in Texas the base industrial rate is adjusted each month as follows: Billings are decreased or increased, as the case may be, at the rate of 1/6 cent per M c.f. for each 1 cent of difference between the base price of $1 per barrel (plus handling charge of 20 cents) and the quoted price per barrel of fuel oil in cargo lots during the preceding month.

It is stipulated in each contract that in no event shall the increase or decrease exceed 5 cents per M c.f., which allows sufficient leeway to meet all but the most severe competition, and insures the customer of ample protection on an increasing market.

In the company's experience this type rate has made natural gas a truly competitive fuel, retaining industrial loads and revenues while laying the groundwork for increasing gas revenues as oil prices come back to normalcy.

Cultivate the Large Volume Water Heating Load

● **H. B. YOST, Hope Natural Gas Co., Clarksburg, W. Va.; addressing the Eastern Natural Gas Regional Sales Conference—(Abstract):**

UNTIL the last 10 or 15 years there was no such thing as *new* business in the old established natural gas territories. Natural gas had *all* the business. This circumstance has lulled some companies into a sense of security as regards some types of business, such as large volume water heating, which came to them without solicitation and which are now subject to competitive inroads if not properly protected.

A study of the water heating business for hotels, restaurants, office buildings, apartment houses, hospitals, etc., show that it is almost ideal from a load factor standpoint.

Rendering a more complete service to the large volume water heating customer will forestall competition in this field. Complete surveys should be made of all installations now served. Actual gas bills should be compared with theoretical to determine whether service is adequate and rendered at proper cost. Changes which will bring economy and better service should be recommended. The customer should be enabled to secure modern gas equipment on equal terms with those offered for competitive equipment.

Favoring the retention of the large volume water heating business is the fact that natural gas competitors sell water equipment incidentally, or without careful study of customers' needs. Close knowledge of these needs is a protection to natural gas companies, and specialists in large volume water heating should be in the company employ.

Pacific Coast Gas Association

Managing Director: Clifford Johnstone
Association Headquarters:
447 Sutter Street, San Francisco

President: George P. Egleston
General Manager, H. R. Basford Co.,
San Francisco

Wm. Moeller, Jr. Elected Vice-President P. C. G. A.

WM. MOELLER, Jr., has been elected by the Association's Board of Directors to the office of vice-president of the Association to fill the unexpired term of J. B. Wilson who has left the Coast.

Wm. Moeller, Jr.

Mr. Moeller is vice-president of the Southern California Gas Co. in charge of natural gas production and transmission, and has been a member of the Association since 1914. He has served on a large number of Association Technical committees, particularly on those dealing with measurement of large volumes of natural gas. He was director of the Association in 1924 and again in 1929 and 1930. In 1930 he served as Chairman of the Technical Section.

Mr. Moeller is a graduate of Stevens Institute of Technology, and has been continuously engaged in the natural gas business in Kansas, Oklahoma and California, since 1907.

New Plan Adopted for Annual Proceedings

AT a meeting of the Board of Directors held in Los Angeles on April 20, a decision was reached which makes a radical change in the Association's policy in regard to publishing its Proceedings.

It has been customary for the Association to publish its reports and papers in a 6 x 9-inch cloth-bound volume. This record of the Association's work goes back to the organization of the Association in 1893. Prior to 1924 it was customary to publish these volumes once every two years. Exceptions to this were Volume 1 which covered the first five years of the Association's existence, Volume 2 which covered only the year 1898, Volume 11 which covered three years, 1915, 1916 and 1917, and Volume 13 which covered the single year 1921. Since 1924 Proceedings have been issued each year in order to make the valuable reports and papers delivered before the Association available to our members as promptly as possible. The last volume published was Volume 23 covering the year 1932.

The publication of the Proceedings has been the Association's largest expense and as an economy measure it had been planned to make Volume 24 a two-year volume covering the years 1933 and 1934. However there has been considerable demand from many sources for copies of our 1933 reports and papers. The Board of Directors has therefore authorized the publication of our 1933 Proceedings without further delay.

As an economy measure the format will be changed. Its size will be 9x12 inches and it will be bound in a heavy morocco board cover. Material for this volume has already been sent to the printer and the volume should be ready for distribution some time in June.

The proceedings for 1934 will be published as a part of the December, 1934, issue of *Western Gas,* prepared in such a way that members desiring to do so may remove the section containing the Association's papers and reports and have them bound in permanent form. No papers and reports will be printed prior to the convention but each committee chairman will be asked to furnish the Association with 25 copies of the report of his committee. This policy will permit the Association to furnish its members with a complete record of Association work more promptly than ever before and at a considerable decrease in expense.

Gas Engineers Handbook Out In June

CIRCULARS describing the Pacific Coast Gas Association's Gas Engineers Handbook have been sent to all Association members accompanied by an order card addressed to the McGraw-Hill Book Co., publishers.

As stated in the circular, the publisher is offering the Handbook at a pre-publication price of $6.50 a copy. This offer is open until June 1 after which the regular price will be $7.50. Members desiring a copy should therefore place their orders before June 1. All orders should go direct to McGraw-Hill Book Co., at 330 West 42nd Street, New York City.

The Handbook is now completely in type and paged. R. E. Many of the Los Angeles Gas and Electric Corp., who read proof for the Association, is now engaged in making up the index. No definite publication date can be set but the book should be ready for distribution some time in June.

This Handbook is another monument to the Association's Technical Section. It was conceived and executed by Association members. Its contents were reviewed by a distinguished committee of the American Gas Association who were all of them most enthusiastic in their praise. The following quotation is an extract from a letter recently received from A. M. Beebee, a member of the American Gas Association committee and general superintendent of the gas department of the Rochester Gas and Electric Corp., Rochester, New York.

"I can assure you that I will be very happy to have a copy of this handbook. While going over the data during its preparation I was very much convinced that this handbook should be one of the finest things of its kind that I had seen.

"Your Gas Association is certainly to be congratulated on the splendid effort you have made in this direction. I only hope that my feeble efforts in helping in this direction justified your having a copy sent to me.

"Through my subscription to the *Western Gas* magazine, I have followed the activities of your Association with a great deal of interest and have been very much impressed with the excellent technical character of your Association activity. Many of the reports and activities of your Association are of such an excellent character that I have valued tremendously your Annual Proceedings which I keep in my personal file."

Drum Div. of P. G. and E. Wins Hockenbeamer Trophy

The Drum Division of the Pacific Gas and Electric Co., San Francisco, Calif., has been awarded an oil painting of Mt. Tamalpais, the 1933 Hockenbeamer Trophy for the most outstanding accomplishment in sales performance for the year, offered by A. F. Hockenbeamer, president of the company.

Personnel of Commercial Sub-Committees

FRANK MOON, Chairman of the Domestic Sales Committee of the Commercial Section, announces the following membership for a number of his sub-committees:

Home Service Committee

Miss Jessica B. Taylor, Chairman, Los Angeles Gas & Electric Corp.
Mrs. Beatrice Strege, Seattle Gas Co.
Miss R. M. Franke, James Graham Manufacturing Co.
Miss Louise Berger, San Diego Consolidated Gas and Electric Co.

Refrigeration Committee

J. E. Kern, Chairman, Southern California Gas Co.
George Smith, Southern Counties Gas Co.
F. J. Southerland, Pacific Gas and Electric Co.
A. L. Spring, California Servel Co.
H. H. Whiteside, Seattle Gas Co.

Water Heating Committee

A. F. Rice, Chairman, H. R. Basford Co.
L. J. Brundige, Pacific Gas and Electric Co.
D. E. Carnahan, Pittsburg Water Heater Co.
W. G. Cartter, Day & Night Water Heater Co.
H. W. Edmund, Coast Counties Gas and Electric Co.
Ray C. Finch, Northwest Cities Gas Co.
W. L. H. Geldert, Southern Counties Gas Co.
I. S. Keyser, Santa Maria Gas Co.
Carl Linde, Seattle Gas Co.
E. J. Ludeman, Washington Gas & Electric Co.
A. C. Miller, Pacific Gas and Electric Co.
Monty Pfyl, San Joaquin Light and Power Corp.
R. J. Phillips, San Diego Consolidated Gas & Electric Co.
Wm. Rick, Hoyt Heater Co.
D. U. Wheaton, Southern California Gas Co.

Auxiliary and Portable Space Heating Committee

John B. Redd, Chairman, Los Angeles Gas & Electric Corp.
Roy Alexander, Seattle Gas Co.
E. V. Daily, Clow Gasteam Heating Co.
S. E. Ledbetter, Southern Counties Gas Co.
J. B. McMahon, San Diego Consolidated Gas & Electric Co.
C. O. Menig, Pacific Gas Radiator Co.
A. C. Miller, Pacific Gas and Electric Co.
L. W. Tannehill, Southern California Gas Co.

Air Conditioning Committee

J. W. Wrenn, Chairman, Pacific Gas and Electric Co.
C. A. Thorp, Vice-Chairman, Los Angeles Gas & Electric Corp.
C. E. Arundel, Southern Counties Gas Co.
Clarence J. Camp, Frigidaire Corp.
J. D. Campbell, Herberts-Moore Machinery Co.
J. Darby, The Mercoid Corp.
D. DeFremery, Union Ice Co.
N. B. Dinkel, General Electric Co.
H. W. Elder, San Diego Consolidated Gas & Electric Co.
W. M. Griffiths, Crane Co.
F. S. Hadfield, Gay Engineering Corp.
Chas. C. Hardy, B. F. Sturtevant Co.
J. A. Hill, Pacific Gas and Electric Co.
E. O. Kaup, W. R. Ames.
E. H. Kendall, English & Lauer, Inc.
F. W. Kolb, American Air Filter Co., Inc.
R. O. Kramer, Fox Furnace Co.
H. L. Lincoln, Union Ice Co.
W. H. Mixter, H. R. Basford Co.
Frank Mosher, Bryant Heater Co.
D. I. Murphy, American Gas Products Corp.
G. W. Nunn, Crane Co.
A. G. Orear, engineer.
J. Frank Parks, Carrier Engineering Corp.
L. H. Polderman, Carrier Engineering Corp.
E. S. Riley, Frigidaire Sales Corp.
Don T. Robbins, Ralph E. Phillips, engineer.
Bert Scott, Payne Furnace & Supply Co., Inc.
J. G. Scott, Herberts-Moore Machine Co.
Bert P. Stern, Geo. Belsey Co., Ltd.
Harry Warren, Southern California Gas Co.
W. W. Williamson, engineer.

Northwest Conference June 21 and 22

A GREAT deal of thought is being given by the Association's officers and section chairmen to the development of an outstanding program for the Northwest Conference to be held in Portland on Thursday and Friday, June 21 and 22. All meetings will be held in the auditorium of the Portland Gas and Coke Co.

The program will be timely and informative. Its theme will be greater sales per consumer and its motif will be a detailed discussion of new and effective sales methods. The year 1934 has already demonstrated that the return of prosperity awaits only the revival of confidence backed by intelligent effort on the part of industry. The gas industry has been quick to accept this challenge and the success of Spring campaigns is proof of the soundness of the industry and the efficacy of the methods employed. These methods will be reviewed at the Portland meeting, placing particular stress on enlisting the aid of dealers and appliance manufacturers so that the number of outlets for dependable gas appliances may be greatly increased and a broad foundation laid upon which to build future business.

Present plans are to devote three half-day sessions to a discussion of sales and kindred problems, and one-half day to a discussion of technical and operating problems.

Compromise Offer Declined in P. G. and E. Proceeding

On April 23 the California Railroad Commission rejected the Pacific Gas and Electric Co.'s offer to compromise the recent natural gas rate reduction order, and ordered an inventory of P. G. and E. gas properties to be made by the company preparatory to a new proceeding. The Commission is requesting a postponement of proceedings in the federal courts to which P. G. and E. appealed the recent rate reduction ruling. In response to the Commission's request that the P. G. and E. offer some proposal for compromising the $2,100,000 reduction in annual natural gas rates the company offered to compromise at 50 per cent, and it is this offer which has been declined by the Commission.

San Diego Water Heater Drive

San Diego Gas appliance dealers, in conjunction with the Gas Appliance Dealers' Association, are engaged in a water heater sales event featuring automatic water heaters at special discounts when they replace manually controlled heaters.

Ranger, Texas, to Odorize

Texas-Louisiana Power Co., headquartering in Fort Worth, Texas, will odorize the gas served to its Ranger, Texas, consumers, according to E. A. Cain, division manager for the company at Breckenridge.

Billings Gas Co. Plans $225,000 Replacement Program

J. E. Moore, manager of the Billings, (Mont.) Gas Co., has announced a $225,000 replacement project for the company. The project will include replacement of 10-inch pipe with 12¾-inch pipe on the company's 14-mile line between Billings and the Yellowstone river crossing near Laurel, Mont., to entail a cost of $175,000. The project is under the direction of I. O. Perl, superintendent of the pipe line division for the company. About $25,000 has been appropriated for replacements on the line which extends southward from the Yellowstone River crossing near Laurel to the Elk Basin oil field, from which Billings and Laurel receive their gas supply. Approximately $25,000 will be expended for repair of the distribution systems at these two communities.

Texas Cities, Community Natural Make District Office Changes

A. P. Rowland, for four years in charge of the Texas Cities Gas Co.'s Paris, Texas, office was transferred early in April to Brownwood, Texas, as manager for the Community Natural Gas Co., succeeding Gene Morgan. W. B. Richards, former manager of the Taylor, Texas, office of Community Natural succeeded Mr. Rowland at Paris. H. V. Smith, until recently manager for the company at Georgetown, Texas, was made manager of the Taylor office. Both companies are Lone Star units and headquarter in Dallas; Texas Cities is a subsidiary of Community Natural.

1934 Calendar

May

Natural Gasoline Association of America—Tulsa, Okla., May 9-11.

Soil Corrosion Conference—Los Angeles, Calif., May 10.

International Petroleum Exposition—Tulsa, Okla., May 12-19.

Mid-West Industrial Sales Council—Palmer House, Chicago, Ill., May 18.

Joint Conference of Production and Chemical Committees, American Gas Association—Hotel New Yorker, New York, N. Y., May 21-22.

June

Canadian Gas Association—27th Annual Convention, Windsor Hotel, Montreal, Canada, June 4-5.

Hydraulics and Aeronautics Division, A.S.M.E.—University of California, Berkeley, Calif., June 19-20; and Stanford University, Palo Alto, Calif., June 21.

Northwest Regional Conference, Pacific Coast Gas Association—Portland, Ore., June 21-22.

September

Second International Gas Conference, International Gas Union—Zurick, Switzerland, September 1-4.

Pacific Coast Gas Association—41st Annual Convention, Hotel Del Monte, Del Monte, Calif., September 11-13.

October

American Gas Association—16th Annual Convention, Atlantic City, N. J., Week of October 29.

Canfield Manager at Ranger For Texas-La. Power Co.

R. B. Canfield, formerly in the commercial department of the Texas-Louisiana Power Co. at Breckenridge, Texas, has been made manager of the company's office at Ranger, Texas, succeeding Olin Calvin, who is leaving the gas industry. Mr. Canfield has been with Texas-Louisiana Power Co. since 1928, beginning his duties in the accounting department of the headquarters office at Fort Worth. He was later transferred to the company's offices at Pecos, and to Kermit, Texas, from whence he went to Breckenridge to join the merchandising staff.

San Antonio Home Service Department on Air

San Antonio Public Service Co. is broadcasting a series of radio programs over Station KTSA each Friday evening at 9 o'clock, featuring its home service work. Home service representatives offer appliance, recipe and menu advice to listeners-in and much of the program continuity is supplied by actual incidents occurring during home service visits.

Mid-West Gas Group Reports Excellent Convention

MID-WEST GAS ASSOCIATION reports the largest attendance since 1929 at its April 16-18 meetings. This convention, the 29th annual session of the Mid-West group, was held at Sioux City, Iowa, with Robert L. Klar of the Des Moines Gas Co., Des Moines, Ia., directing events as president of the Association. Attendance came to more than 200.

Elections for the 1934-1935 term brought the following into office:

Officers:

President: C. T. Williams, Sioux City Gas & Electric Co., Sioux City, Iowa.
1st Vice-President: F. H. Brooks, Northern Natural Gas Co., Omaha, Neb.
2nd Vice-President: H. M. Smith, Iowa Public Service Co., Waterloo, Iowa.
Secretary-Treasurer: R. B. Searing, Sioux City, Iowa.

A.G.A. Affiliation Representatives:

Commercial Section: Stanley Taber, Iowa-Nebraska Light & Power Co., Lincoln, Neb.
Accounting Section: Wm. N. Porter, Iowa Public Service Co., Sioux City, Iowa.
Technical Section: P. A. Stover, Central States Electric Co., Cedar Rapids, Iowa.
Manufacturers' Section: Thos. Bullion, Detroit-Michigan Stove Co., Detroit, Mich.
Advertising Section: C. A. Nash, United Light and Power Engineering & Construction Co., Davenport, Iowa.
Industrial Section: L. O. Rasmussen Union Light, Heat & Power Co., Fargo, North Dakota.

Publication of a house heating booklet, prepared under the auspices of the Mid-West Gas Association, was announced at the convention. This booklet is 24 pages, 6 by 9 inches; through attractive typography and specially drawn illustrations it effectively lives up to its title—"Helpful Suggestions on Home Heating with Gas." It is designed for presentation to home heating prospects by local gas companies, and is available to gas companies through the Mid-West Gas Association at 12 cents per copy. Inquiries relating to the booklet should be addressed to R. B. Searing, secretary-treasurer of the Association, 302 Utilities Building, Sioux City, Iowa.

A number of the papers from the Mid-West group's sessions will be found reviewed on other pages of this issue.

Canadian Association Ready for its 27th Meeting

GEORGE W. ALLEN, secretary-treasurer of the Canadian Gas Association, has announced a tentative program for the Association's 27th annual convention, June 4-5 at the Windsor Hotel, in Montreal, Quebec. Following is a list of papers scheduled:

Employee Education, Looking toward Sales, Good Will and Public Relations—S. B. Severson, vice-president, Dominion Natural Gas Co., Ltd., Buffalo, N. Y.
Servicing of Gas Holders—Herbert W. Alrich, assistant engineer of construction, Consolidated Gas Co. of New York, New York, N. Y.
Promotional Rates For Gas Service—O. L. Maddux, industrial engineer, United Gas & Fuel Co. of Hamilton, Ltd., Hamilton, Ont.
Operating and Checking a Waterless Gas Holder—H. C. Osler, superintendent gas stations, Montreal Light, Heat & Power Co., Montreal, Que.
For and Against Rubber Main Joints—J. D. Von Maur, engineer of distribution, Consumers' Gas Co. of Toronto, Toronto, Ont.
Producer Gas Fuel Practice—L. T. Calhoun, chief chemist, Montreal Coke & Mfg. Co., Montreal, Que.
Sales Promotion Work for the Future of the Gas Industry—M. L. Kane, general sales manager, Union Gas Company of Canada, Limited, Chatham, Ont.
Purification of Gas Works Waste Water—Allyn C. Taylor, president, Consumers Gas Co., Reading, Pa.

Fluid Mechanics to Feature A. S. M. E. Program

A NATIONAL meeting of the Hydraulics and Aeronautics division, American Society of Mechanical Engineers, will be held at the University of California, Berkeley, and at Stanford University, Palo Alto, June 19, 20, and 21. The first two days of the meeting will be on the University of California campus, and the third day at Stanford.

Professor William F. Durant, Stanford University, is honorary chairman and Professor Baldwin M. Woods, University of California, is general chairman in charge of arrangements. Professor A. B. Domoske is in charge of arrangements for the Stanford sessions.

Of principal interest to gas men is a symposium on long pipe lines—oil, water, and gas—scheduled for Wednesday afternoon. A similar program appears on Thursday afternoon at Stanford, including oil and water lines. Frank Wills of the Pacific Gas and Electric Co., is serving as chairman of the sub-committee in this field. One paper will cover friction factors in long line transmission, reflecting experience on the P. G. and E. and Stanpac lines into San Francisco and Oakland; another will deal with the subject "Other Parameters than the Reynolds Number"; material is also being prepared on a formula for the flow of gases, taking into consideration the deviation from Boyle's Law.

A. F. Mitchell to Speak to Mid-West Industrial Sales Council

A. F. Mitchell of the Northern Indiana Public Service Co., Hammond, Ind., will be the principal speaker at the Mid-West Industrial Sales Council meeting on May 18, in Chicago. The title of Mr. Mitchell's paper will be "Past, Present and Future of Forging."

B. C. Electric Concludes Oldest Gas Range Contest

THE British Columbia Electric Railway Co., Ltd., Vancouver, B. C., recently concluded a unique contest to discover the oldest gas range in use on its existing gas mains.

The contest was designed, with the aid of a coupon published in Home Service News, a monthly publication of the company circulated to each customer with the service account, to uncover the replacement market, to dislodge older models and replace them with gas ranges of a modern type.

About 250 entries were received over a period of two months, all registering ranges over 10 years of age. The oldest entry was manufactured in 1896, making it 38 years of age. It had been in continuous service since manufacture. Its owner was awarded, in exchange, the choice of any range from the company's showroom up to the value of $125.

Impressions gathered from the contest were (a) the slight depreciation apparent on gas ranges (b) the fact that they are being used in the company's territory as auxiliary to wood and coal ranges (c) the low wage scale of the entrants.

Many of the models inspected were still giving exceptional service although sadly lacking in modern appearance. They were situated in homes coming within the lowest wage brackets and in most cases were being used as a secondary means of preparing meals, the necessity of economy calling for use of a coal or wood stove to provide warmth in the kitchen.

Considerable interest was created by exhibition of the old range and the new one given in exchange as a prize, in the main display window at the company's Vancouver headquarters.

In addition to the interest the contest created, it provided a list of select prospects for new gas ranges. Preparatory to the follow-up on these, all contestants received a letter notifying that as a consolation prize they were entitled to one-half of one per cent discount for each year of the age of their own particular entries. The result of the contest was made known in March, and a number of the prospects have been sold new ranges since that time.

150 Attend A. G. A. Home Service Conference

MEN and women interested in home service made up an attendance of 150 at the American Gas Association's two-day conference held in Chicago, April 13 and 14. The conference was sponsored by the Home Service Committee. Its chairman, Dorothy E. Shank, director of American Stove Co.'s research kitchen, presided at the various sessions, assisted by Jessie McQueen, home service counsellor, American Gas Association.

One session of the conference was devoted to the subject of kitchen planning. R. J. Rutherford, New England Gas and Electric Association, Cambridge, Mass., developed a kitchen modernization resume, outlining organization plans for this type service, and several home service directors told of how these plans operate in their own company. A kitchen planning material exhibit was presented to the group by Ada Bessie Swann, Public Service Electric and Gas Co., Newark, N. J.

The speaking program arranged for the conference was of high calibre and several of the papers will be reviewed in future issues of *Western Gas*.

So. Counties Advertising Serves Property Owners

Southern Counties Gas Co., Los Angeles, Calif., issued an advertising message in April, appearing in several score Southern California newspapers, which constituted an unusual service to property owners on its system. In prominent space the company urged property owners whose taxes were delinquent to take advantage of a state law permitting payments on back taxes to be spread over a 10-year period. April 20 was the deadline for taking advantage of this law, which fact was featured in the Southern Counties copy as a service to those of its patrons who might have been on the point of losing their homes due to delinquent taxes.

Pacific Lighting Earnings on Common Show Gain

For the year ending March 31, 1934, Pacific Lighting Corp. earned $2.64 a share on its outstanding common stock as against $2.58 a share for the corresponding year previous. Gross operating revenue for the year ending March, 1934, increased $208,456. Pacific Lighting is the parent company for Los Angeles Gas and Electric Corp., Southern California Gas Co. and Southern Counties Gas Co., all headquartering in Los Angeles.

Ohio Oil Co. Completes Large Gasser

The Ohio Oil Co, Casper, Wyo. reports completion of a 30,000,000-foot gas well in the northeastern part of Wyoming. A second well recently completed has been gauged at 17,500,000 cubic feet. Gas from both wells will be turned into the Dutton Creek line which supplies Laramie and Medicine Bow, Wyo. The Rocky Mountain Gas Co., subsidiary of the Ohio Oil Co. distributes in Medicine Bow and Laramie.

Elbert McMillan New Manager At Cuero, Texas

Elbert McMillan, formerly with the Texas Power and Light Co., has been appointed manager for the Southwest Gas Co., at Cuero, Texas. The Southwest Gas Co. headquarters at Shreveport, La.

MODERN METHODS AND MATERIALS

A letter to WESTERN GAS will bring you any of the selected reference bulletins listed below, without cost. Indicate by number which you desire.

NO. 1—ARC WELDING MANUAL

Practical guide to use of electric arc welding process. Types of joints and welds; weldability of metals; electrodes; metallic and carbon arcs; operating instructions; examples. 80 pages; 83 illustrations.

NO. 2—RESISTANCE THERMOMETERS

Manufacturer's specifications for line of indicating, recording, and automatic control types, measuring temperatures from 300° to 1000°F. Also thermometer accessories. 32 pages; illustrated.

NO. 3—HIGH TEMPERATURE INSULATION

Principles of heat transfer; theory and practice of conductivity values of insulation and refractories; insulation in boilers, kilns, oil stills, furnaces, regenerators. Formulae for heat transfer by conduction; method of calculating heat flow through furnace walls. 32 pages; 25 figures.

NO. 4—COMPRESSOR UNITS

Rating specifications and prices for air compressor ¾ to 7½ motor H.P. units. 4-page bulletin.

NO. 5—TRUCK AND TRAILER RESTRICTIONS

Reference summary of state laws governing truck and trailer size and weight restrictions, revised to January 1, 1934. Pocket size handbook, 56 pages.

NO. 6—WELDING FITTINGS

Series of charts on flexibility of welded piping design; new types of welding fittings and flanges; frictional resistance of fittings; specifications for standard fittings; pressure-temperature ratings of seamless fittings for welding. 64 pages; numerous charts, tables.

NO. 7—ODORIZING

Capacities and construction details, gas odorizers; reduction of "unaccounted-for" losses by odorization. 4 pages, illustrated.

NO. 8—PIPE LINE EQUIPMENT

Specifications and price information, general line of pipe line, road and roofing equipment. 24 pages; illustrated.

NO. 9—INDUSTRIAL BUTANE-PROPANE

Methods of transporting, unloading, storing, vaporizing and distributing, liquefied petroleum gases for industrial uses. Separate bulletins on butane and propane, 8 pages each; illustrated.

NO. 10—REGULATOR PERFORMANCE

Series of bulletins giving operating characteristics and performance data for various type regulators. Numerous tables and curves.

NO. 11—REFRACTORY BONDING MATERIAL

Free 5-pound sample of bonding material for fireclay brick, and bulletin describing product.

Production-Chemical Joint Sessions Due in May

A TENTATIVE program has been set up for the joint conference of the A.G.A. Production and Chemical committees, which will take place at the Hotel New Yorker, New York City, May 21-22. E. F. Pohlmann, Peoples Gas, Light & Coke Co., Chicago, Ill., is chairman of the Chemical Committee. J. V. Postles, Philadelphia Gas Works Co., Philadelphia, Pa., is chairman of the Production Committee.

Among the scheduled features are these:

Problems Confronting the Gas Engineer—C. E. Paige, vice-president and chief engineer, Brooklyn Union Gas Co.

Report: Water Gas Committee—H. B. Young, The Chicago By-Product Coke Co.

Paper: Reformed Natural Gas—H. Wiedenbeck.

Report: Sub-committee on New Developments—S. S. Tomkins, assistant chief chemist, Consolidated Gas Co. of New York.

Papers:

(a) Evaluation of Oils for the Manufacture of Carburetted Water Gas by Their Available Hydrogen Content.

(b) A Method of Ultimate Analysis of Organic Substances Developed from Combustion in a Bomb Calorimeter. P. J. Merkus and A. H. White.

Paper: Granulated Blast Furnace Slag for Dry Box Purification—R. L. Presbrey, engineer of manufacture, Boston Consolidated Gas Co.

Report: Sub-committee on Analysis and Tests—J. F. Anthes, assistant to chief chemist, The Brooklyn Union Gas Co.

Paper: Changes in Meter Diaphragms in Service—L. M. Van der Pyl, Pittsburgh-Equitable Meter Co., Pittsburgh, Pa.

Report: Carbonization Committee—F. J. Pfluke, assistant engineer, Rochester Gas & Electric Corp., Rochester, N. Y.

Paper: Material for Dust Treating Coke—H. J. Meredith, chief chemist, Seaboard By-Product Coke Co., Kerny, N. J.

Paper: High B.t.u. Gas as a Stand-By—H. B. Young, The Chicago By-Product Coke Co.; D. M. Workman, gas engineer, Utilities Power & Light Corp., Chicago, Ill.

Paper: Smoke Elimination—T. B. Hopper, engineer of manufacture, Washington Gas Light Co., Washington, D. C.

Paper: Hydrogen Balance in Reforming Gases—L. J. Willien, operating gas engineer, Byllesby Engineering & Management Corp., Chicago, Ill.

Paper: Gum Deposits in Distribution Systems—W. H. Fulweiler, chemical engineer, The United Gas Improvement Co., Philadelphia, Pa.

Paper: Relation of Coke Oven Operation to Gums in Gas—W. L. Shively, chemical engineer, Connecticut Coke Co., New Haven, Conn.

Paper: The Dust Problem—Louis Shnidman, laboratory director, Rochester Gas & Electric Corp., Rochester, N. Y.

Paper: Gas Conditioning with Reference to Oil Fogging and Rehydration Practice—H. E. Ferguson, plant testing engineer, The Peoples Gas, Light & Coke Co., Chicago, Ill.

Open Forum.

Gas Exhibit Will Repeat at 1934 Exposition

THE gas industry will be present, with a new exhibit, when the 1934 Century of Progress Exposition opens in Chicago on May 26. The same space that was occupied last year by the industry in Home Planning Hall has been contracted for this year.

In compliance with the Exposition management's wishes last year, all displays emphasized the historical, educational and technical advances of industry. Direct appeals of a commercial character were ruled out. This year the situation has changed, and the gas exhibit will especially emphasize the utilization of gas in modern appliances.

The latest models of all household gas appliances and equipment will be "starred" in the gas exhibit. These will be portrayed in model kitchens, basements and other suitable settings to complete a well-rounded story of direct appeal to the user and prospective user of gas.

A number of changes have been made in the Exposition's layout this year. The Midway, scene of bright lights and the ballyhoo of the carnival type of amusement, has been moved to Northerly Island. Space formerly given over to the Midway is now utilized by the new German, Tyroleon and other Villages entirely new this year. At other places within the fair grounds many new features replace the old.

A new structure housing the extensive Ford transportation exhibit — the most important single addition to the Exposition this year—is located about a block away from the gas exhibit and is bound to increase attendance at all attractions within that immediate neighborhood. The model homes are still in place and are now being redecorated for the opening date.

With an advance sale of 1,000,000 tickets reported, and with statements from hotel proprietors that advance registrations exceed those of a year ago, it appears as if the Exposition would attract a large following.

Lone Star Properties Conduct Service Surveys

A SERIES of service surveys has been under way for some time on the systems of the Community Natural Gas Co. and the Texas Cities Gas Co. (Dallas, Texas), and Stamford and Western Gas Co. (Stamford, Texas), all Lone Star properties. Company employees visit homes in each town to check up on the condition of customers' appliances and to make needed adjustments without cost to consumers. All appliances are lighted to ascertain whether they are burning properly, and burners are cleaned to rid them of dirt and lint.

In addition to appliance adjustments employees are prepared to answer questions regarding source of supply, methods of distribution, company policies, and appliances. A file of survey cards has been set up in each office and will be kept current by meter readers, service men and salesmen. Recapitulations of the files will be sent to company officials by managers of the Lone Star subsidiaries.

The Dallas Gas Co. and the Fort Worth division of the Lone Star Gas Co. are also introducing similar surveys.

U. S. Court Dismisses Merchandising Case

ON April 9 the U. S. Supreme Court dismissed the case testing validity of the Kansas anti-utility merchandising law, thus bringing to an end the Kansas attempt to prevent gas and electric companies from merchandising appliances.

As reported in the April issue of *Western Gas,* Roland Boynton, attorney general of Kansas, last December filed an appeal before the U. S. Supreme Court, and on February 19 the Court determined that it would hear the case, which was therefore argued and submitted on April 2. On April 9 the Court dismissed the case.

The Kansas law became effective on March 13, 1931, and prevented sales after August 1 of that year. The Gas Service Co. filed test cases in the Shawnee County District Court in the names of 10 of its subsidiaries which were merchandising in Kansas, and continued to merchandise under temporary injunctions. Following the Shawnee District Court decision of November 4, 1931, holding the law to be valid, the company appealed to the Kansas State Supreme Court which on June 10, 1933, held the law to be unconstitutional.

The Gas Service Co. throughout the litigation has been represented by Judge Robert D. Garver, chief counsel of The Gas Service Co., and Robert Stone, Topeka, attorney.

A.G.A. Issues 1933 Annual Proceedings

The 1933 American Gas Association Proceedings is now ready for distribution. The edition has approximately 1000 pages, is fully illustrated and completely indexed. It covers the year's progress of the Association, culminating in the International Gas Conference and the 15th annual convention of the A.G.A. Copies are available from Association headquarters, 420 Lexington Avenue, New York, N. Y., to members at $3.00 each, and $7.00 to non-members.

Savory, Inc. Appoints Tapley California Representative

W. H. Rudolph, manager of the Appliance Division of Savory, Inc., manufacturers of the Savory Radiant Gas Toaster and the Savory Radiant Gas Broiler, has announced the appointment of Osborn F. Tapley as California representative for his company.

Mr. Tapley has established headquarters at 1415 Santa Fe Avenue, Los Angeles, where he will maintain a showroom and complete service facilities.

COMMITTEE:
DOUGLAS BUCKLER...SO. CALIF. GAS CO.
J. EARL JONES.....SEATTLE GAS CO.
A. C. JOY (CHAIRMAN).....P. G. & E.
D. L. SCOTT.....L. A. G. & E. CO.
PIERRE VINET.....C. C. G. & E. CO.

1934 P·C·G·A

HEADQUARTERS:
PACIFIC COAST GAS ASSOCIATION
447 SUTTER STREET, SAN FRANCISCO

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CLIFFORD JOHNSTONE, MNG. DIRECTOR

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AMONG the 20 leading trade journals carrying our cooperative advertising every month are *"Western Plumbing and Heating Journal"* and *"Western Furniture Retailing"* . . . both widely read by active and prospective appliance dealers.

Special advertisements are prepared for these magazines, each featuring a progressive plumbing concern or store that cooperates with the gas companies and makes appliance-selling pay.

Results: good will on the part of the leaders so featured . . . sales hints and inspiration for thousands less active or successful . . . increased potential gas-appliance sales and connected load—benefits shared by the entire gas industry throughout the West.

Reproduced in miniature are typical ads in the series now appearing in these dealer magazines, supplementing our Coastwide industrial advertising plan.

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GAS APPLIANCE MERCHANDISING
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SPECIALIZATION
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SUCCESS
Gas the modern fuel
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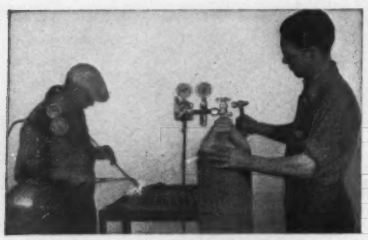
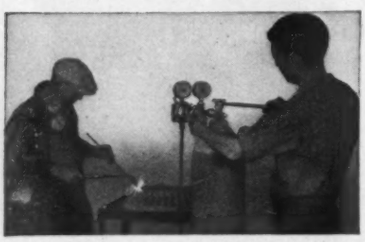
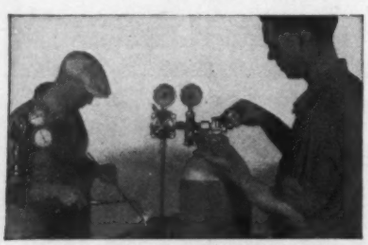
Here's a KEROTEST about to be inspected under full 2000 pounds cylinder pressure without interrupting the welder. First, he turns the valve stem left to the full open position.



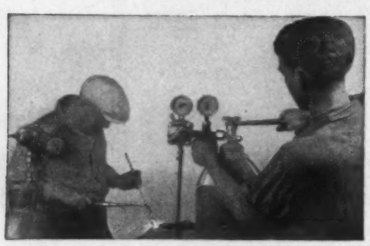
Second—The forged brass valve bonnet cap is then tapped lightly to loosen the threads.



Third—Open end wrench is applied to the two flat sides of the bonnet cap and unscrewed by turning to the left.



Fourth—KEROTEST Diaphragm Discs are lifted out of valve for inspection or replacement while the welder continues his work without the slightest interruption—an exclusive KEROTEST feature.



Fifth—After discs are replaced, the bonnet cap is set back on the valve and screwed tight.

SO successful and widely demanded are KEROTEST Packless Diaphragm Valves that they have become widely imitated, but never excelled, because of their patented back-seating design.

For example, KEROTEST is the only make of Diaphragm Valve that can be repaired while under service pressure. The illustration shows that a KEROTEST Type 132 Packless Valve being inspected on an oxygen tank **under the full 2000 pounds pressure,** while the welder continues to use gas without any interruption.

The patented back-seating feature of the KEROTEST Diaphragm Packless Valve, Type 132, does the trick. It makes possible the checking or renewal of the metal diaphragm discs in less than one minute!

All that is necessary is to turn the operating stem to full open position, tap the forged bonnet cap lightly to loosen threads, unscrew with open end wrench —and presto! the diaphragms are ready for inspection or replacement.

The whole operation requires less than a minute **without interrupting the flow of the gas through the service line.**

No other valve has this outstanding KEROTEST advantage—just one of the many reasons why KEROTESTS are preferred for this service. Write for our special bulletin describing the complete line of KEROTEST Cylinder Valves.

KEROTEST

KEROTEST MANUFACTURING CO.

Pittsburgh, Penna.

BUTANE • PROPANE NEWS

Vol. 4, No. 5 May, 1934

14.1 Per Cent Gain Shown In 1933 Sales Totals

TABLE I. MARKETED PRODUCTION OF LIQUEFIED PETROLEUM GASES, 1927-1933

Year	Gallons	Increase over previous year	Per cent of increase over previous year
1928	4,522,899	3,431,894	314.6
1929	9,930,964	5,408,065	119.6
1930	18,017,347	8,086,383	81.4
1931	28,769,576	10,752,229	59.7
1932	34,114,767	5,345,191	18.6
1933	38,931,008	4,816,241	14.1

DISTRIBUTION of liquefied petroleum gases in 1933 showed an increase of approximately 4,800,000 gallons, or 14.1 per cent, compared with the total marketed production in 1932.

A statistical summary for the industry's operations in 1933 has been prepared by A. T. Coumbe, Jr., associate economic analyst, Petroleum Economics Division, U. S. Bureau of Mines. E. B. Swanson is chief economist of the Petroleum Economics Division. Following is a portion of the liquefied petroleum gas report:

The 1933 gain over 1932, although not as great as recorded in previous years, indicates a steady growing demand for these products. Table No. 1 shows the marketed production of liquefied petroleum gases for the years 1928-1933, inclusive, together with the respective annual increases and percentages of increase.

The liquefied petroleum gases included in this survey are propane, butane, pentane, and propane-butane mixtures. Demand for butane was outstanding in 1933, increasing from 14,661,688 gallons in 1932 to 19,056,230 gallons in 1933. Butane for domestic use increased from 81,981 gallons in 1932 to 705,894 gallons in 1933, while industrial and miscellaneous requirements were 12,179,766 gallons in 1933, compared with 7,353,856 gallons in 1932. The gas manufacturing industry used less butane in 1933, the total being 6,170,570 gallons, compared with 7,225,851 gallons the previous year. Slightly smaller quantities of propane went into domestic consumption and gas manufacture in 1933 compared with 1932, while industrial and miscellaneous uses showed an increase. Although the demand for pentane and propane-butane mixtures showed a small net loss for 1933, compared with 1932, the quantity required for industrial and miscellaneous purposes was greater in 1933 than in the previous year. The pentane deliveries declined from 854,126 gallons in 1932 to 813,725 gallons in 1933.

Liquefied petroleum gases delivered in tank cars, tank wagons or pipe lines, increased from 19,717,798 gallons in 1932 to 24,515,445 gallons in 1933, while the total shipped in cylinders or drums was practically the same as in 1932. This increase in tank car and tank wagon deliveries was to be expected, as the increase in demand for these gases in 1933 was nearly all limited to the industrial field where bulk shipments are predominant.

This survey covers reports submitted by 21 companies, five of which operate in the Pacific Coast area. Deliveries of the Pacific Coast companies totaled 6,714,922 gallons in 1933, compared with 6,173,456 gallons in 1932, while the quantity marketed east of California was 32,216,086 gallons in 1933 and 27,941,311 gallons in 1932. A list of producers of liquefied petroleum gas is available upon a request addressed to the Petroleum Economics Division, U. S. Bureau of Mines, Washington, D. C.

Supplement No. 7 to Bureau of Explosives Pamphlet No. 9 Issued

Supplement No. 7 to Bureau of Explosives Pamphlet No. 9 has just been issued. All changes to Bureau of Explosives Pamphlet No. 9 containing I.C.C. regulations for the transportation by rail of explosives and other dangerous articles in freight, express, and baggage service, and shipping container specifications, are now included in Supplements No. 5, 6 and 7.

TABLE NO. 2. SEGREGATION BY USES OF MARKETED PRODUCTION, LIQUEFIED PETROLEUM GASES
(Figures in Gallons)

Uses	Propane	Butane	Pentane and Propane-Butane Mixtures	Totals 1933	Percent 1933	Totals 1932*	Percent 1932
Domestic	14,334,412	705,894	1,585,282	16,625,588	42.7	16,244,103	47.6
Gas Manufacturing	199,534	6,170,570	1,948,221	8,318,325	21.4	9,703,470	28.5
Industrial and Miscellaneous	1,300,784	12,179,766	506,545	13,987,095	35.9	8,167,194	23.9
Total	15,834,730	19,056,230	4,040,048	38,931,008	100.0	34,114,767	100.0
Shipped in—Cylinders or Drums	13,299,883	124,680	991,000	14,415,563	37.0	14,396,969	42.2
Tank Cars, Tank Wagons, or by Pipe Line	2,534,847	18,931.550	3,049,048	24,515,445	63.0	19,717,798	57.8
Total	15,834,730	19,056,230	4,040,048	38,931,008	100.0	34,114,767	100.0

*Revised figures.

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Fuel of the Future

BUTANE is an efficient, economical substitute for manufactured gas, natural gas, and electricity for domestic and industrial uses, including heat-treating, cutting, welding, refrigerating. The perfect fuel for rail motor cars, busses, trucks, stationary engines.

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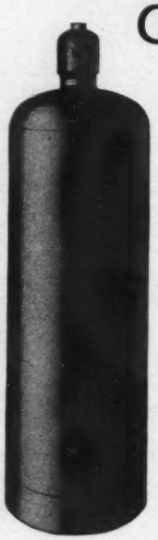

FOR LIQUEFIED PETROLEUM GASES

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MANUFACTURED IN ACCORDANCE TO I. C. C. SPECIFICATIONS

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CAPACITIES TO MEET CUSTOMERS REQUIREMENTS

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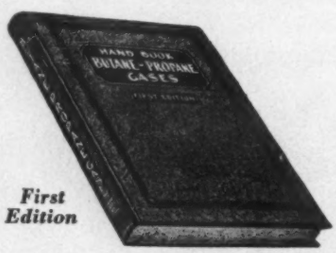

First Edition

BUTANE-PROPANE GASES

280 Pages

CONTENTS INCLUDE

- A Chronology of Liquid Gas Development.
- Physical Properties of the Liquefied Petroleum Gases.
- Properties of Butane-Propane Mixtures and Relation of Properties to Temperatures.
- Composition and Analytical Determination of Liquefied Petroleum Gases.
- The Manufacture of Liquefied Petroleum Gas.
- Transportation of Liquefied Petroleum Gases.
- The Use of Butane and Propane with Manufactured Gas.
- Central Plants for Butane-Air Service.
- Central Plants for Undiluted Butane-Propane Vapor Service.
- Liquefied Petroleum Gases as Industrial Fuels.
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- Bibliography.
- Index.

ORDER NOW Send $5.00 to WESTERN GAS, 810 South Spring Street, Los Angeles, Calif.

Consumers Gas Corp. Succeeds Nat. Gas Corp. of Ore. at Bend

The Consumers Gas Corp., Bend, Ore., recently organized to purchase properties of the Natural Gas Corp. of Oregon in Bend, Ore., completed negotiations early in April and has applied for a franchise, requesting the repeal of the franchise granted to the Natural Gas Corp. of Oregon. This franchise includes Deschutes county in addition to Bend.

Norman Coleman, in charge of the Bend plant for several years, has been retained as manager. The company has 22.6 miles of city mains serving 992 meters with butane air gas.

New Patents Granted in Liquefied Petroleum Gas Industry

Among recent patents in the liquefied petroleum gas industry is No. U. S. 1,939,084 granted late in 1933 to the Columbia Engineering and Management Corp., New York, N. Y., on a method for producing propylene. A more recent grant is U. S. 1,952,860, in March, 1934, to the Linde Air Products Co., New York, N. Y., on a device for vaporizing liquefied gas.

Santa Maria Gas Co. Makes Interesting Installations

R. E. Easton, president and general manager of the Santa Maria (Calif.) Gas Co., reports that among recent commercial cooking installations made by the company was that of a three-section range, combination roaster and broiler in the famous Santa Maria Inn. A two section range installation operating on butane was also recently made at a Buellton, Calif., cafe.

Pittsburgh Equitable-Merco Nordstrom to Exhibit at 1934 Chicago Fair

The Pittsburgh Equitable Meter Co. and its subsidiary, the Merco Nordstrom Valve Co., announce that their exhibit at the 1934 Chicago fair will occupy the same space in the General Exhibits Building as it occupied in 1933.

The complete line of Pittsburgh water, oil and gasoline meters, Emco gas meters and regulating equipment, and Nordstrom lubricated plug valves will be on display.

Austin, Minn. Authorizes Survey For Municipal Gas System

Black and Veatch Co., Kansas City, Mo., has entered into a contract with the city of Austin, Minn., for which it will make a survey as to the possibility of establishing a municipal gas distribution system. Final reports are to be submitted by December, 1934. The cost of the survey is estimated at $3500. Austin is at present served by the Interstate Power Co. with manufactured gas. J. A. Vandenberg is local superintendent.

American Liquid Gas Corp. Granted Franchise in Holtville, Calif.

The American Liquid Gas Corp., Los Angeles, Calif., has been granted a 35-year franchise by the city council of Holtville, Calif., to pipe and transport butane gas in the community.

To Build Town Plants in Illinois on P.W.A. Funds

Reports were current late in April that three towns in Illinois have been granted P.W.A. appropriations for construction of butane plants and complete municipal distribution systems. It is understood that Bushnell has been granted an appropriation of $80,000, Rushville $72,000 and Sullivan $79,500. Thirty per cent allotted to each community is a grant. The balance is a loan secured by 4 per cent revenue bonds. Construction is estimated to require six months.

L. H. Spiner Now Assistant Manager Shell Sales Promotion-Adv. Dept.

L. H. Spiner, former manager of the Shellane division, Shell Oil Co., Kansas City, Mo., has been appointed assistant manager of the company's sales promotion-advertising department. Mr. Spiner went to the Lansing, Mich. office of the Shell Oil Co., late in 1929 as district manager of the Shellane division, technical products. Early in 1931 he was transferred to the Kansas City office, becoming sales manager of the division, and in October of that year he was made manager of the Shellane division, which position he held until his present appointment.

11th International Acetylene Congress Convenes June 5-10

The convening date of the 11th International Congress of the acetylene, oxy-acetylene welding and allied industries, has been announced for June 5-10, 1934. The purpose of the Congress which will be held at Rome, Italy, is for scientific technical and economic study of questions relating to calcium carbide, acetylene, oxygen, oxy-acetylene welding, and to their various applications. Descriptive circulars giving complete information concerning the Congress are available from F. R. Fetherston, secretary, Compressed Gas Manufacturer's Association, 110 West 40th Street, New York, N. Y.

Republic Steel Corp. Names New Distributors

N. J. Clarke, vice-president in charge of sales for the Republic Steel Corp., announces the appointment of the Barde Steel Co., Doran Co., both of Seattle, Wash., Earle M. Jorgensen Co., Los Angeles, Calif., and the Gate City Iron Works, Omaha, Neb. as distributors of Enduro stainless steel. The latter company has also been named distributor of Toncan copper molybdenum iron.

Franklin Co. Gas Co. Supplements Supply By New Line

The Franklin County Gas Co., Ottawa, Kan., is constructing a 3-mile pipe line of 6-inch pipe, to connect its new gas field north of Ottawa with the Ottawa city water and light plant. The company already supplies the plant with gas from its field west of Ottawa.

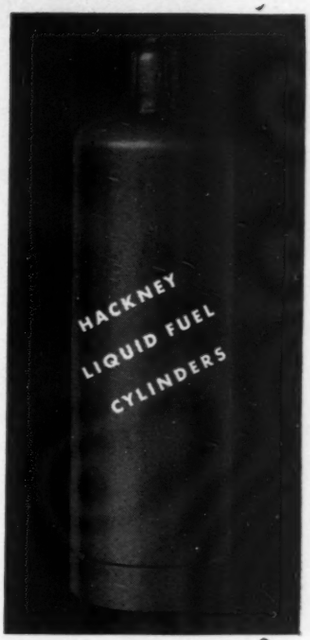
HACKNEY IS PREFERRED

Hackney Liquefied Petroleum Gas Cylinders are *preferred* by leaders in the field.

There are twice as many in service as all others combined.

Long experience, intelligent design, and skillful workmanship have combined to give Hackney Cylinders the ability to out-perform all others.

Virtually every leading firm in the field uses Hackney Cylinders.



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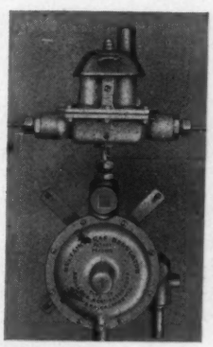
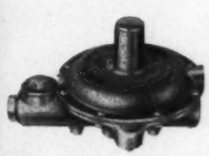
CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

RELIANCE REGULATORS
for Automatic Control of Bottled Gas Fuels





On the left is illustrated the spring loaded, canopy type MR Regulator with a secondary type BK Regulator. Above is illustrated the BK secondary type Regulator.

Reliance liquid petroleum gas regulators are recommended in duplex operating types for the best results. The primary MR regulator reduces extremely high pressures encountered in the service cylinder when first intalled to an intermediate pressure of from 3 to 10 pounds. The BK regulator then reduces this pressure to a uniform outlet pressure required for proper utilization which insures uninterrupted service to the appliances. The BK regulator can be operated independent of a primary regulator when manifold valves are employed.

Write for Bulletin No. 30 explaining in detail all types of Reliance Regulators and accessories designed for bottled gases.

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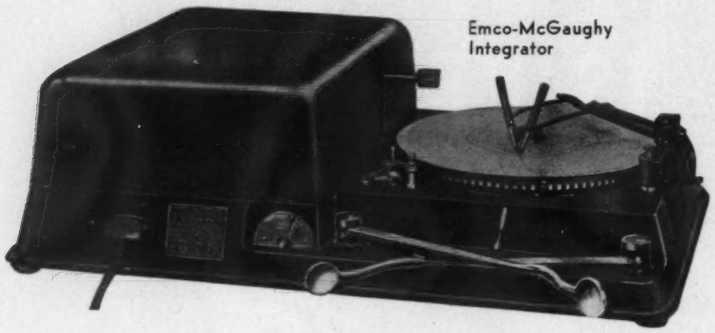

Emco-McGaughy Integrator

The Emco-McGaughy Integrator

By J. L. COTTRELL

*Manager, Integrator Division, Pittsburgh Equitable Meter Company**

THE Emco-McGaughy Integrator, developed and perfected during recent years by the Pittsburgh Equitable Meter Co., is designed for the purpose of calculating the total extension of orifice meter charts. It is now possible to calculate with one machine, Emco, Foxboro, and Westcott charts in any static or differential range and in any atmospheric pressure that may be used at the point of measurement. This is accomplished by changing the pen arms to correspond with the make of chart to be calculated. Separate arms are necessary due to the fact that the radius from zero to the upper limit of the chart varies on all three of these meters.

J. L. Cottrell

The degree of angle of arc is also different on each of the different makes. The differential pen on each set of pens is made to follow the arc line on the chart, and the static pen is set with a time lag and does not follow any given time arc, but can be adjusted to correspond to the time lag of the meter that is recording the chart.

The problem of arriving at the total extension of an orifice meter chart is to take time, times any infinite number of instantaneous square root values of both static and differential, multiplying the one by the other, and accumulating the product.

There are several methods of calculating orifice charts, but the Integrator is the only method that takes each corresponding instant of static and differential into consideration, and gives an instantaneous integration and renders the sum and total of the extension exactly like the static and differential records were recorded on the chart by the meter, taking into consideration each tenth of an inch of differential from zero to the upper limit of the chart, even though it should exceed the upper limit of the chart and be recorded above the graduated scale; also taking into consideration each fraction of a pound of static pressure from zero to the upper limit of the chart.

Each corresponding instant of static and differential is integrated as we correct the time lag of the static pen on the Integrator to correspond exactly with that of the meter which is recording the chart originally.

The inspection method of reading charts is a rather slow method, as it is necessary to actually look at the static and differential lines as recorded, and write the static and differential values on the chart or on an orifice report slip for each of the two values corresponding to the static and differential range of that particular chart; then look up the extension for each hour corresponding to the static and differential range read, writing the extension on the chart or orifice report slip, then totaling these 24 extensions before the orifice coefficient can be applied to arrive at the M c.f. of gas.

In cases of widely fluctuating static and differential lines, it is necessary to use the 15-minute inspection method, which means reading the static and differential for each 15 minutes rather than each hour, and using a 15-minute extension, which makes four times the amount of work as compared to the hourly inspection method. Both of these methods are theoretically wrong, due to the fact that we are taking an average of the two square root values instead of an instantaneous reading. For example, averaging the line on a 100-inch chart where the differential may start from 10 inches and rise to 100 inches, then drop back to some lower value of differential, then rise back up to the upper limit of the chart, and repeat this procedure a number of times during any 15-minute or hourly period on the chart, is not reading the extension exactly as it was recorded by the meter.

Design of Integrator

The Integrator is so designed that the integrating mechanism is driven from the time plate, this being the lower plate on the machine, which is driven directly from the gear case, which is operated by an electric motor controlled by a rheostat. The chart plate and time plate are connected together by a small line shaft, so that when the time plate starts to turn the chart plate turns in a constant ratio with the time plate. The speed of the chart plate can be increased or decreased by the rheostat control, but the ratio of the revolutions of the chart plate and time plate is always the same.

Resting on the time plate is a small steel roller which is mounted on a lower carriage of the machine, known as the static carriage. To this carriage is attached a static cam. The static roller contacts the lower side of the upper plate, which is known as the pressure plate, and as the time plate revolves, this in turn turns the static carriage roller, which makes the pressure plate revolve. On the top side of the pressure plate is a second steel roller, which is connected to the differential carriage and to that carriage is attached a differential cam. To the differential carriage roller a tube is attached which holds the counter shaft and counter.

The pressure carriage is supported by each of the carriage brackets by pivot screws which allow it to rest freely on the static carriage roller. An extension shaft from the differential carriage extends to the outer edge of the pressure plate, and a coil spring is attached at that point so as to hold the differential carriage roller firmly to the pressure plate at all times. Both the time plate and the pressure plate are covered with rubber, and the machine is so designed that friction loss at varying speeds is entirely eliminated.

Both the differential and the static carriages are mounted on slide rods which are connected to each of the carriage brackets.

The operator when running the chart operates the two control arms on the front of the machine, the one on the right for the differential pen and the one on the left for the static pen, in such a way as to make the two pens trace the lines as recorded on the chart by the meter. From each of these control arms a linkage is connected underneath the machine to the left hand side of the machine, and from this point the motion is transferred to the top of the machine through an interworking sleeve, and there one arm is connected by linkage to the static carriage and one to the differential carriage, so that when the operator moves the control arms the two

*Presented before the Southern California Meter Association, February 15, 1934.

carriages shift backward and forward in such a way as to make the static and differential carriage rollers go straight back and forth across the time plate and the pressure plate. Therefore, as the radius across the time plate is increased or decreased, the speed of the static carriage roller is increased or decreased, which in turn increases or decreases the speed of the pressure plate.

The differential carriage roller is then governed by two things—first, the speed of the pressure plate, and second, the radius of the roller in or out from the center of the pressure plate.

The static and differential cams which are fastened to each of the respective carriages are square root cams and are laid out in such a way that they vary as the square root of the pen position varies across the chart. Fastened to a pivot shaft on the right carriage bracket is a static and differential arm which extends out to the static and differential cams. At the end of each of these arms is a small ball bearing roller which rolls along the surface of this stainless steel cam. Small coil springs are connected underneath the machine in such a way as to hold the static and differential arm against the static and differential cams. Therefore, as the static and differential control arms are operated the static and differential carriages are shifted back and forth on the carriage slide rod, which in turn shifts the static and differential carriage rollers in and out across the time plate and pressure plate, and as this is done the static and differential arms automatically roll along the curve of the square root static and differential cams and in turn actuate the two pens across the chart.

Therefore, the shifting of the static and differential carriage roller position with relation to each of the revolving plates simply multiplies the two square root values one by the other, as the pens are tracing over the recorded lines on the chart while the chart plate is rotating. Meanwhile the accumulation of these instantaneous values is being made by the counter.

The operator merely has to operate the static and differential control arms and make the two pens follow the recorded lines on the chart, and does not have to concern himself with the mathematical calculation that is being made by the machine.

The lower side of the chart plate is machined out into notches which represent 15 minutes of time on a 24-hour chart. A starting time indicator is connected to the chart plate and points directly to the differential pen which follows the arc line on the chart. When placing a chart on the machine, it is set at the starting point of the differential line. The time indicator can then be set to correspond to the number of hours or minutes as recorded on the chart. For example, if a chart should run 26½ hours, the time indicator would be shifted to the left of the starting position 2½ hours, then this amount would be read, and the time indicator would stop automatically at that time. It would then be released and the remaining 24 hours would be read and the machine would again stop at the completion of the 24-hour revolution. In case only 21 hours should be recorded on a chart, or any fraction thereof, the Indicator would be shifted to the right of the starting point, so as to take care of the exact interval of time as recorded on the chart.

In view of the fact that it is imperative to take the exact amount of recorded time into consideration when calculating the extension exactly as it was recorded by the meter, the machine is so designed that when the time indicator is set for an interval of time which corresponds to the amount as recorded on the chart, the chart plate revolves to this point, the time indicator trips and operates a small brake which is rubber faced. This brake then instantly contacts the differential carriage roller and lifts this roller off of the top surface of the pressure plate, so that the counter which is accumulating the sum and total of the extension is stopped at the exact instant that the chart has completed the time cycle for which it was set. Therefore there is no chance of the counter recording after the chart plate has stopped. When the time indicator trips off, a small plunger goes into one of the slots in the chart plate, which stops the chart plate on the finish lines of the recorded chart at the same instant the counter is stopped.

Three small needles are set around the center shaft or the chart plate which pierce into the chart and hold it fast to the chart plate, so that it will not slip with relation to the revolutions of the chart plate while it is being integrated.

Fountain pens are used on the Integrator and superimpose an ink tracing line over the original chart record, so that the tracing of the chart may be checked at a glance and it is not necessary to run it a second time in order to prove the calculations. Contrasting shades of ink may be used in the Integrator pens as compared to the ink used in the meter, so that the two records will not be confused in any way.

A continuous counter is used, similar to the index on a house meter, and trips at 100,000. The continuous counter is used so that it is possible to check the operator for transposition of figures in reading the counter.

Procedure in Running Chart

The procedure in running a chart is to first take the reading of the counter before the chart is run, tilt the pens back, place the chart on the chart plate, and trace the two curves as recorded on the chart, and at the completion take a second counter reading, then subtract the difference between the two readings, this difference being the sum and total of the 24-hour extension in case of a 500-pound 100-inch chart, as the machine is designed for a constant of 1,000 on this particular range. For static and differential ranges other than this, it is necessary to apply a machine constant which is calculated by taking the square root of one range over the other. For example, a 500-pound 50-inch chart would have a constant of .707, which would be the square root of ½. Or a 250-pound 100-inch chart would have a constant of .707, which would still be the square root of ½. If, for example, 10 charts of corresponding ranges were being run, the counter reading would be noted at the start of this group of charts, and would be noted again at the completion, then the addition of the subtracted differences on the 10 charts run should equal the difference between the counter reading at the start and finish of the run. In this way a transposition of figures can be checked, and if an error is made it is only necessary to turn back through the charts and see where the reading was transposed, as a stop reading on the last chart would compare to the start reading on the next chart, and the reading can be checked in this manner. The multiplying of the machine constant by the subtracted counter reading in order to arrive at the total extension, can be eliminated by multiplying the machine constant by the orifice coefficient after the various other corrections have been applied to the coefficient. Then the subtracted counter reading serves as the total extension for the chart and eliminates one multiplication on each chart.

The static pen arm on the Integrator is made in two pieces. On the upper section a small plate is made and on this plate holes are drilled which represent the various static ranges to be calculated. A small taper pin is used to hold the upper half of the pen arm to the lower half, which is connected to the pen rod. Then a small thumb screw, which screws into the bottom half of the arm and operates in an elongated slot in the upper half of the arm, is used to hold the two firmly together. The static pen zeros on the chart when the range hole pin is in the 500-pound static range hole, as the machine is designed with a constant of 1.000 on the 500-pound 100-inch chart, as before mentioned.

To set the machine for other static ranges, it is necessary to loosen the thumb screw, shift the pen back to the range which is to be calculated, place the range hole pin through the range hole, tighten the thumb screw, and run the chart.

Assuming the 500-pound chart as one, we then set the static pen back equivalent to two atmospheres for 250-pound range, five atmospheres for 100-pound range, and proportionately for other ranges.

Emco-McGaughy Integrator with cover removed.

The Integrator can be designed to calculate as many static ranges in any combination of atmospheric pressures as may be desired. This feature is particularly adapted to calculating charts which are recorded in mountainous sections of the country, as it is important that the extension as well as the coefficient be corrected to the existing atmospheric pressure at the point of measurement. Correcting the machine for the existing atmospheric pressure where spring type meters are used eliminates the necessity of shifting the static pen position from zero in order to correct for varying atmospheric pressures. Where the square root chart is used the static pen on the Integrator is shifted to a range which is marked square root. In this case the static pen on the integrator is set at absolute zero rather than atmospheric. The same static pen setting is used on the Integrator for all square root charts, and the coefficient is corrected for the static and differential range for which the meter is set, the same as would be done if the chart were calculated by any other method. The existing atmospheric pressure is taken into consideration on the static pen on the meter on square root charts when it is set for the static range that is to be recorded; therefore no change is required on the Integrator.

There are some types of charts that cannot be handled by the set back pen method. The Westcott M-30 chart is a combination 30-inch vacuum-0-20-pound pressure. As this is not a true curve, it is necessary to use an extra static cam for this particular range. The curve of the cam in this case would brake at the zero point, one side of the curve being for pressure and the other side for vacuum. The machine can be changed for this range by shifting the range indicator so that the static cam arm tracks on the M-30 cam. For the Foxboro non-uniform or so-called old style chart, it is necessary to use separate static and differential cams in order to take care of the variations in the graduations on the chart. The zero and upper limit position of this cam would be the same as the uniform cam, but the cam would be slightly larger through the center in order to take care of the variation in the scale of the chart. When this type of chart is to be calculated the range indicator can be shifted in such a way as to make the static cam arm and differential cam arm track on the non-uniform cams.

Any Emco Orifice Chart, Foxboro uniform or so-called new style, or Westcott Chart, with the exception of the M-30, can be calculated on the uniform cams so long as the static range is not below 50 pounds. For ranges lower than 50 pounds it is necessary to use an extra cam for the particular range. The various crank arms which operate the pen assemblies are all linked and geared together so that the same uniform static and differential cam can be used for all uniform charts. A set of gears is used to speed up the pen movement across the chart in proportion to the increased radius of the Foxboro chart as compared to the Westcott chart, and linkage is used from the Foxboro chart to the Emco chart for the same purpose. By connecting the three pen movements together in proper ratio, it is not necessary to use separate static and differential cams for the three different makes of uniform charts, thereby simplifying the construction and operation of the machine. Each set of pen arms for the three different makes is so designed that the differential pen follows the arc line on the particular chart and the static arm is made up to take care of as many ranges as desired for that make of chart.

The Integrator is adaptable to any time movement of chart used, whether it be 15 minutes, 24 hours, 7 days, etc. Constants are available for any time cycle desired, so that the extension rendered will be the extension for that chart, whether it makes a complete or partial revolution. In running charts which are recorded for a complete revolution of the chart and on which the differential rests at zero for some continuous period of time, it is not necessary to run this interval of time as the time indicator can be set to calculate the portions of the chart which show a differential reading.

When the differential goes to zero for a short interval of time several times during the revolution of a chart it is only necessary to push the differential pen to the zero line; as this is done it throws the differential carriage roller wheel directly in the center of the pressure plate and the roller is then at a standstill and the counter cannot record.

Correcting Erroneous Charts

There are cases when an orifice meter will be found at error when the meter inspector tests the meter. For example, the static or differential pen may be off of zero. Quite often the differential pen is found slightly low, due to loss of mercury when the differential would exceed more than the upper limit of the chart. Charts may have been recorded from a meter which is in this condition for some time, and when the meter is found in error and the amount of the error reported to the office, the question is then to calculate that chart correcting for the amount of error existing in the meter. If the differential varies throughout the range of the chart, to apply a correction for the percentage of the error is entirely wrong, due to the variation in gauge capacity from zero to the upper limit of the chart. A set of dividers which are fitted to a pen cap can be placed on either the static or differential pen on the Integrator and the divider point adjusted so that it does not quite touch the chart. Then the distance between the tip of the divider and the tip of the Integrator pen can be adjusted to correspond to the amount that the meter was found in error. Then the line that is recorded by the meter can be traced with the tip of the tracing pen divider, and the Integrator will then integrate and record a line where the meter should have recorded. In this way an accurate corrected reading is obtained, regardless of how much the differential or pressure may fluctuate.

In cases where wide range combination gauges are used, that is a 20-inch and a 100-inch, or a 10-inch and a 50-inch, usually there is no pressure element in the 10-inch or 20-inch gauge. To calculate these charts on the Integrator or by any other method, it is necessary to transfer the static from the 50-inch or 100-inch chart to the 10-inch or 20-inch chart, as the case may be. To calculate these combinations on the Integrator, the static is transferred from the 50-inch or 100-inch chart to the 10-inch or 20-inch chart by first placing the chart on the Integrator to which the static record is to be traced. Then a sheet of high grade pencil carbon paper is laid over that chart. Then the chart which has the static record is placed on top of the chart to which the record is to be transferred. Then the two charts are matched hour by hour. Then the push button on the chart plate is pushed down firmly so as to pierce the three needles through the two charts, to hold them together with relation one to the other. Then a small metal stylus is slipped over the static pen on the Integrator and a small weight slips over the pen cap which is heavy enough to trace through a 7 point paper chart. Then the differential pen is ignored, or tilted back out of the way so as not to record on the chart. Then the static line on the 50-inch or 100-inch chart is traced over and this record is transferred to the 10-inch or 20-inch chart exactly as it appears on the chart which was originally recorded by the meter, as both of the charts are matched up exactly for time, and are held from exactly the same center. Then both the 10-inch or 20-inch chart and the 50-inch or 100-inch chart can be calculated, as each chart now has a static record.

The time indicator can be set so as to calculate the number of hours to be calculated on the 10-inch or 20-inch chart. Then the number of hours on the 50-inch or 100-inch chart is calculated. This method would be used where the differential is readable for any continuous length of time on the 50-inch or 100-inch chart. The reading can then be used on the 10-inch or 20-inch chart for the remaining continuous length of time which was not read on the other chart. In cases where the differential fluctuates quite rapidly from zero to the upper limit first on one chart and then on the other, the 50-inch or 100-inch chart should be read for the portion which exceeds the upper limit of the 10-inch or 20-inch chart, and when it is below the upper limit of the 10-inch or 20-inch chart the differential pen is pushed to zero, which will stop the counter as this reading will appear on the 10-inch or 20-inch chart. Then the 10-inch or 20-inch chart is run where the differential is readable on that chart, but never going above the upper limit of the 10-inch or 20-inch chart, as that reading has been calculated on the 50-inch or 100-inch chart. When the differential exceeds the upper limit on the 10-inch or 20-inch chart, the differential is pushed to zero as when running the 50-inch or 100-inch chart. The machine constant can then be applied to each of the respective differential ranges and the coefficient applied to each of the extensions. Where the square root chart is used the coefficient on the two charts would be different. But on spring type meters the coefficient would be the same, and in that case the two extensions could be added together after the machine constants had been applied, and in that way would eliminate one multiplication of the orifice coefficient by the extension to arrive at the M c.f. of gas.

The Integrator can be tested for accuracy from day to day by placing the static and differential pen on any given line on the chart and tracing perfect circles. Then the subtracted counter reading should equal the sum and total of a pre-determined extension for that particular range of chart. The machine can be adjusted to check on these

MRS. MODERN prides herself on being up-to-date in all things. She lives, moves and has her being in the light of *today*, with her face steadily turned toward *tomorrow*. She keeps abreast of current happenings, fashions and new ideas and developments affecting the home. In this realm, hers is the last word as well as the first . . . .

You are absolutely dependent on her good will. She dictates the lines you must handle. She decides where and how you must do business. For Mrs. Modern is *your customer* — the average woman of today . . . .

Mrs. Modern demands leisure and time for other interests besides cooking. She refuses to spend all of her day in the kitchen. Nevertheless for the time she does spend there, she insists that the kitchen be as modern and pleasant as any other room in the house . .

That's why Magic Chef appeals to her. She sees in it the *gas range of today* and for *today*, meeting her requirements of style and beauty, measuring up to her standards of modern efficiency, convenience and ease of operation.

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WORLD'S LARGEST MANUFACTURER OF GAS RANGES

BOSTON • NEW YORK • ATLANTA • CLEVELAND • CHICAGO • PHILADELPHIA • ST. LOUIS • SAN FRANCISCO • LOS ANGELES • SEATTLE

various circle tests from 1/10 to 3/10 of 1 per cent. This variation from the true value is due to the eccentricities of charts and to the expansion and contraction of paper due to varying humidity, and some slight tracing error made by the operator.

The square root cams are calibrated originally with both the static and differential carriages locked and are made to read within 1/10 of 1 per cent of the known values on all of the circles as shown on the chart.

There is a micrometer pen adjustment on each of the pen arm assemblies which can be adjusted so as to change the pen positions to take care of the variation in charts. By changing this adjustment the ratio of the pen movement across the chart is changed with relation to the movement of the roller along each of the square root cams, and in this way the pens can be adjusted to secure the proper circle tests when proving the machine before the recorded charts are calculated. These test charts can then be kept from day to day as a matter of record, proving the accuracy of the machine.

Operating the Integrator is a fairly simple procedure, and with two or three weeks practice it is possible to run as many as 250 to 300 average charts per day. However, the number of charts calculated on the Integrator depends entirely on the regularity or irregularity of the static and differential records, which is a governing factor in reading charts by any other method. The tracing of the two recorded lines becomes a subconscious procedure and the operator is relieved of the mental strain of actually making the mathematical calculations which are so tiresome when calculating charts by the inspection method.

The Integrator is adaptable to office use, and may be operated on any standard office desk or table. The machine complete weighs only 65 pounds. Due to its rugged construction it may be transferred from place to place without affecting its adjustment.

S. C. M. A. Discusses "Gadgets" at April Meeting

THURSDAY, April 26, was "Gadget Night" for the Southern California Meter Association. Following dinner at the Lakewood Golf Club, Long Beach, Calif., a short paper was read by M. E. Carrico, of the Southern California Gas Co., describing "A New Way of Metering a Fluctuating Load." President C. B. Heartwell and Program Chairman F. E. Bradley then directed an hour and a half of interesting gadget presentations, under which head many members told of unusual devices and methods which have proved serviceable in measurement and control work.

After the general discussion eight different gadget ideas were selected for prize competition, as follows:

1. Ink holder made from a 15-cent fountain pen, for carrying recorder ink.
2. Check valve and mercury pot for Foxboro C type meter.
3. Oil seal to protect bourdon tube from corrosive fluids.
4. Differential pen "jumper" for pulsating meters.
5. Pulsation indicator.
6. Bearing box packing hook.
7. Device for metering high and low fluctuating gas volume.
8. Meter pot cleaner.

A general vote was taken among those present and the first item, the remodeled fountain pen for carrying recorder ink, was selected as the winning gadget. This gadget was submitted, and one of the pens exhibited, by R. F. Angel, who was awarded a 10-inch slide rule and case donated as a gadget prize by the Mid-West Piping and Supply Co., Inc. All of the eight gadgets will be described in an early issue of *Western Gas.*

Lakewood Golf Club will be the location of the S. C. M. A.'s May 24th meeting, the program for which will be sponsored by the Foxboro Co.

390 Register for 10th Annual Short Course

THE 10th Annual Southwestern Gas Measurement Short Course, held at the University of Oklahoma, Norman, Okla., April 24 to 26, was regarded by its sponsors as the most successful in the history of the project. With a registration of 390, it was the second largest in point of attendance, being within 50 of the high record attendance in 1929.

In the reorganization of the Short Course general committee on April 26, D. C. Williams of the Kay County Gas Co., Ponca City, program chairman for this year, was elected chairman of the general committee to succeed W. R. McLaughlin of the Arkansas Natural Gas Corp., Shreveport, La.

Ray Roundtree, of the United Gas Public Service Co., Houston, Texas, was appointed by Chairman Williams to succeed Gilbert Estill of the Oklahoma Natural Gas Co., Tulsa, Okla., as chairman of the committee for the study of practical methods.

Interest in the class work at the course this year was keenest in the history of the school, and manufacturers' representatives and others identified with the project from its inception, in 1924, declared the results secured this year to be an outstanding contribution to the advancement of the industry.

Registration this year included representatives of 17 states and 4 foreign countries. The states represented were the following: Alabama, Arkansas, Colorado, Iowa, Kansas, Louisiana, Massachusetts, Missouri, Mississippi, Montana, Nebraska, New Mexico, New York, Ohio, Oklahoma, Pennsylvania and Texas. The foreign countries were Argentina, Belgium, England and Persia.

Fred Karr Re-elected As Missouri Ass'n Head

FRED KARR, vice-president of St. Joseph (Mo.) Gas Co., was re-elected president of the Missouri Association of Public Utilities at the annual state convention of the Association held April 19 and 20 at the Elms Hotel, Excelsior Springs, Mo.

Fred Karr

The other officers elected were: First Vice-President, C. E. Michel, Union Electric Light & Power Co., St. Louis, Mo.; Second Vice-President, C. F. Farley, Kansas City Power & Light Co., Kansas City, Mo.; Third Vice-President, D. W. Snyder, Jr., Missouri Power & Light Co., Kansas City, Mo.; Treasurer, Hermann Spoehrer, Union Electric Light & Power Co., St. Louis, Mo.; Secretary, N. R. Beagle, Missouri Power & Light Co., Jefferson City, Mo.; Assistant Secretary, Jesse Blythe, Jefferson City, Mo.

Executive Committee: W. H. Swift, Jr., Springfield (Mo.) Gas and Electric Co.; T. J. Strickler, Kansas City (Mo.) Gas Co.; L. W. Helmreich, Capital City Water Co., Jefferson City, Mo.; E. H. Lewis, St. Louis County Gas Co., Webster Groves, Mo.; Fred H. Luecke, Missouri Public Service Co., Warrensburg, Mo.; A. E. Bettis, Kansas City (Mo.) Power & Light Co.; H. M. Patton, Union Electric Light & Power Co., St. Louis, Mo.; H. B. Newman, Missouri Utilities Co., Cape Girardeau, Mo.

The member companies of the Association include virtually every privately-owned electric, gas, water, and street railway utility in Missouri. About 200 delegates from throughout the state attended the meeting.

Whatcom County Natural Gas Co. Granted Franchise

The Whatcom County Natural Gas Co., Bellingham, Wash., has been granted a 25-year franchise to serve natural gas in Whatcom County, Wash., by the Whatcom County Board of Commissioners. C. S. Shippey is president of the company, which also applied recently for franchises to distribute natural gas in Bellingham and Ferndale, Wash. H. O. Griffin is vice-president of the organization; and A. L. Morrison, secretary-treasurer. The company has asked for permission to sell $250,000 worth of stock in Washington at $5 per share.

Ralph Hageman, General Manager For Johnson Gas Appliance Co.

Ralph Hageman has been appointed general manager of the Johnson Gas Appliance Co., Cedar Rapids, Iowa, manufacturers of gas burners, soldering, annealing, house heating, metal melting and heat treating furnaces, and torches for use in the gas industry.

TEXAS BEATS

OWN REFRIGERATION RECORD FOR 1933

IN FIRST 3 MONTHS

OF THIS YEAR!

TEXAS gas men are out to win a Blue Vase . . . and they don't mean maybe! During the first quarter of this fiscal year, January through March, they've rung up more Electrolux sales than during the whole of last year. And that's particularly significant because 1933 was a record-breaking year for these energetic Texans!

Every Employee a *Go-Getter!*

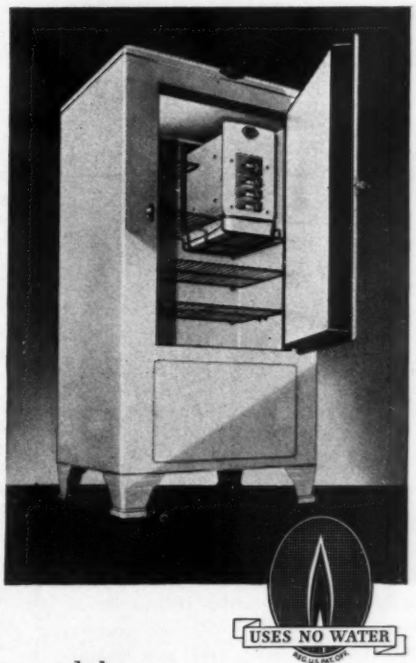
The new A. G. A. "Go Getter Campaign" presents a challenge that the employees of the Lone Star System don't intend to pass up. Every one of them—from meter-reader to president—has enlisted to help win the prize.

Extensive advertising promotion is also under way. And throughout the length and breadth of Texas, schools and sales meetings have been held regularly by every gas company since February first.

New Salesmen Taken On!

Nor is that all! Sales forces have been *enlarged.* In Dallas alone. sales personnel has been tripled. If you think these Lone Star boys are fooling when they say, "We're going to make this our biggest gas refrigeration year"—then you don't know Texas!

And they've got the product to do it with! The beautiful new 1934 Air-Cooled Electrolux



models are easier than ever to sell. They embody all those worthwhile modern conveniences every woman wants. Be sure your company doesn't miss the real opportunity presented this year to make the refrigerators in your territory *gas* refrigerators.

Electrolux Refrigerator Sales, Inc., Evansville, Indiana.

NEW *Air-Cooled* ELECTROLUX

THE SERVEL *Gas* REFRIGERATOR

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Bank of America.....El Centro, Calif.
So. Calif. Gas Office.....Inglewood, Calif.
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The reason for the long life and low maintenance cost of cast iron pipe is its effective resistance to rust. Cast iron is the one ferrous metal for water and gas mains, and for sewer construction, that will not disintegrate from rust. This characteristic makes cast iron pipe the most practicable for underground mains since rust will not destroy it.

For further information, write to The Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, 309 Peoples Gas Bldg., Chicago, Ill.

CAST IRON PIPE

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Natural Gas as Sponge Iron Reductant

(Continued from Page 15)

varying conditions of kiln temperature and feed, not so much to show the best that could be done, as to illustrate the rather marked differences in behavior of various ores.

In general, the temperatures shown in Table No. 2 are the maximum temperatures which may be used for the particular varieties of ore without having serious sticking and sintering of the reduced iron grains. The variation of feeds is influenced considerably by the apparent density of the ore charged. The metallization percentages of the next to last column are for the most part to be regarded as satisfactory—they represent the metallized iron as determined by an accurate method. The copper sulphate method previously much used by sponge-iron experimenters was shown to give high results in almost every instance—sometimes as much as 10-15 per cent too high. It is very probable that many previous experimenters have been deceived by the supposedly correct copper sulphate method; certainly that was our own experience in the early stages of the work.

The gas utilization of the last column may seem disappointing to the casual reader, but when it is considered that of the total kiln length of 6 feet, only some 4 feet were at reaction temperature, due to feeding cold ore, the gas utilization seems rather good, after all.

To summarize briefly our experiences with this kiln, which was operated continuously for several months total actual operating time, with average continuous campaigns of a week or ten days, it may be said that the mechanical behavior was excellent and the metallurgical behavior much more promising than any known previous attempt to produce sponge iron by natural gas. The prime difficulty encountered was the limitation of maximum temperatures, due to the stickiness of reduced sponge at these temperatures. On such ores as limonite or eastern hematite this was not as serious as with soft materials, such as pyrite cinder.

It was further apparent that whereas measured over-all gas consumptions ranged from 30,000-40,000 cubic feet per ton of reduced iron compared to a theoretical minimum of about 20,000, valid operating cost or gas consumption figures could hardly be expected on such a small unit, nor could any certain estimate be made from the data on one kiln of the probable capacity of a larger unit of given dimensions.

The capacity and effectiveness of a given kiln were shown to be practically limited by the maximum temperature usable, but this temperature depends almost entirely upon the stickiness of the reduced sponge. A few degrees increase of temperature in this critical range greatly improves the reduction rate and in consequence, the gas utilization. The problem of the stickiness of the sponge is one that has been a bugbear to every previous attempt to produce sponge iron commercially in continuously operating units. Williams and coworkers used dilution with carbonaceous material to overcome this difficulty, but such a solution has serious and obvious disadvantages even when solid carbonaceous material is used for reduction. It is clear that any practical development of the sponge iron process must involve a solution of the sticking problem, at least for certain types of ores.

Extraneous Solution of the Sticking Problem

In our experimental work with the 6-foot kiln, considerable evidence had accumulated to show that the stickiness was primarily a function of the *surface* behavior of the reduced particles. This conclusion prompted the attempt so to alter the surfaces of the individual particles as to lessen their stickiness in the reduced state; even a few degrees higher temperature made possible by such procedure were known to be well worth while.

The rather difficult problem of so altering the surface of individual ore particles without entailing excessive costs was tentatively solved by a combination of mechanical and chemical pretreatment of the ore before reduction. Unfortunately, at about this time Bureau of Mines funds available for the sponge-iron tests were exhausted, and adequate tests could not be completed, but enough work was done to show a very considerable improvement to be possible. Discussion of details of the methods used must be postponed until more complete tests have been performed.

Present Status of the Method

As intimated above, Bureau of Mines funds could not be found after July, 1933, to continue this work, which represents approximately two years effort, and something like three man-years labor. Until this time the project had been carried entirely on regular funds appropriated to the Pacific Experiment Station.

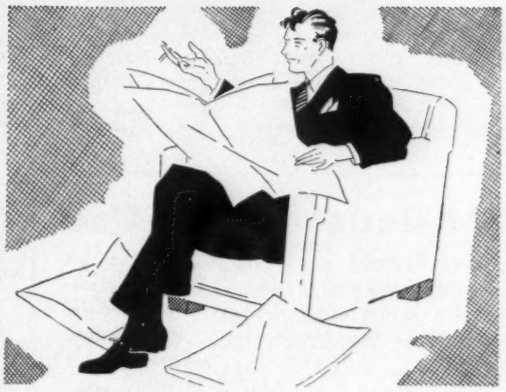
Our work had been watched with great interest by a number of commercial organizations, among them the Mountain Copper Co., San Francisco, William F. Kett, general manager. This organization has available at Martinez, in the San Francisco Bay region, a considerable accumulation of leached pyrite cinder, as well as other ores in Shasta County, which constitute an asset to the community as well as to the company only if some method becomes available to utilize them for the production of a commercially salable product. This problem has been with the company for a great many years, and many attempts have been made by them to convert these potentially valuable products into marketable iron and steel. The company therefore decided after July, 1933, that the experiments should be continued upon a scale large enough to determine the commercial feasibility of the method which had been worked out on the laboratory scale. The specific objectives of the larger-scale experiments, which had obviously now graduated to the process-development class, and were no longer justifiable as Bureau problems are as follows:

1. To build a semipilot plant unit of an estimated capacity of about 1 ton per day.

2. To operate such a unit long enough to confirm the economic suitability of the methods proposed, and if successful to

"Huh—that doesn't make ME want to buy"

One of the vagaries of human nature is to dislike what we don't understand . . . which probably explains why some folks don't like advertising.



When a man has a limited working capital, he is often skeptical about advertising. At first this is only assumed in an attempt to hide his fear or indecision. But when some big fellow's campaign fails to click and he cries out in baffled rage, then the timid dealer is sure he's right. What he doesn't know is that the seasoned advertiser soon calms down, realizes his efforts were ill-advised, poorly timed, or badly prepared, and goes back to work—a better advertiser because of his experience.

This synthetic anvil chorus frightens scores of dealers out of advertising at all. Others advertise only spasmodically in the mistaken belief that they are playing safe. And while they are "playing safe" some more determined competitor is stealing customers from under their nose.

Don't get caught in this dangerous rut. It's an easy matter to convince yourself that a do-nothing policy is best. Particularly as we like so well to judge advertisements in terms of our own reactions. The usual verdict is "Huh! that doesn't make ME want to buy," whereupon we put everybody in ME's place and give everybody ME's negative reaction at that particular moment and glibly condemn the advertisement as worthless. How we love to fool ourselves when it justifies our actions—or in this case, our in-action.

If you are ever tempted to sit back and "play safe," imagine you are faced with the task of splitting a rock with a sledge hammer. You strike blow after blow but the rock hardly chips. Once again you swing the sledge and this time the rock breaks clean in two. Did the last blow split the rock? Of course not. Each of the blows helped and all of them were necessary. So it is with advertising. One advertisement might break down a prospect's sales resistance, more probably several advertisements will be necessary. You never know until the sale is made. To stop short of this point leaves the prospect still a prospect when one more time might have made him a customer. Multiply this by your local newspaper's circulation and you can see why sustained advertising is so effective.

There is a sales promotion advisor at our local office who will gladly give you some pointers on how to break down mass sales resistance with the fewest possible blows. We earnestly suggest that you see him today.

P • G • and E •
PACIFIC GAS AND ELECTRIC COMPANY
Owned • Operated • Managed by Californians

obtain cost data and engineering data justifying the construction of a true pilot plant.

3. To produce sponge iron in sufficient tonnages so that the utility and local salability of the product may be confirmed by tests by potential users of the product.

At the present writing (February, 1934) a kiln unit some 25 feet long and 20 inches in internal diameter is being constructed; the catalytic converter part of the unit has been structurally completed, and is in the process of preliminary testing. The work is under the general direction of Thomas B. Swift, Martinez plant superintendent, and under the direct charge of the junior author, who is under furlough from the Bureau at the request of the company. A serious and conservative attempt is being made to commercially develop a process for producing sponge iron, by the use of natural hydrocarbons, suitable for conditions on the Pacific Coast, and the results of further experiments will be awaited with great interest by all anxious to develop the natural potentialities of our western region along these lines.

On St. Louis Co. Directorate

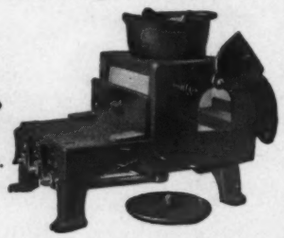
Bernard J. Ryan of the St. Louis County Gas Co., Webster Groves, Mo., meter department, will serve as employee member of the utility's board of directors for the coming year. He succeeds Henry Frank of the construction department, whose term on the directorate has expired.

A Bench Furnace for General Shop Use

The Johnson No. 118 Combination Bench Furnace is a real utility furnace. A melting pot and bench furnace for heat-treating and heating soldering coppers —all in one unit. One small investment brings a furnace that will perform all the heating jobs in the average shop. Be sure to investigate the Johnson No. 118. Write for details.

JOHNSON GAS APPLIANCE CO. Cedar Rapids IOWA

Pacific Coast Representative—C. B. BABCOCK CO. 135 Bluxome St., San Francisco, Calif.



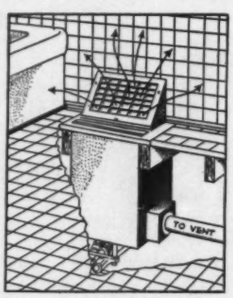
WARD WALL-HE-TOR

Economical gas heat for the bathroom

Now for the first time in gas history, a vented appliance, ornamental, and taking up little space, is available for bathrooms. This has been made possible by the Ward Wall-He-Tor, which will heat the average bathroom for as little as half-a-cent an hour, depending upon local gas rates.

Wall-He-Tors are ideal for dens, breakfast rooms, and small bedrooms. They may also be used as unit systems for houses without basements.

Write for literature, terms, and prices. Ask about Ward Floor Furnaces with Bilt-In Thermo-Control.



WARD HEATER COMPANY
1800 W. Washington Blvd.
Phone PArkway 9171 Los Angeles, Cal.

If you would keep in touch with the Natural Gas and Butane industries, send a check for $2.00 to

WESTERN GAS
810 South Spring Street, Los Angeles

Name.....
Company.....
Position Occupied.....
Street Address.....
City and State.....

Subscription Rates: I Year $2.00; 3 years $5.00; Foreign $3.00 per year.

Planning for House Heating Sales

(Continued from Page 10)

Advertising For Mass Sales Campaigns: Advertising in itself seldom produces sales. Advertising is the artillery which destroys the barriers to sales. Advertising is effective in direct proportion to the number of times its message reaches the prospect. This means that a sound advertising campaign must be unrelenting in its attack and must never give the prospect an opportunity to escape its effect.

In order to accomplish such results every medium of advertising should be employed. Newspapers should be used to attract attention of the prospect at leisure. Billboards are utilized to hurl a quick message as he walks or rides throughout the city. The radio catches him as he sits in his home. Direct mail secures his immediate individual attention.

In planning the advertising campaign, careful thought must be given to the results which are to be accomplished. To those who are familiar with the facts, gas is superior to all other fuels as a means of heating the home. If this opinion were universally held, there would be no problem in selling gas. It is because this opinion is not universally held that there is a sales problem in connection with developing this market.

Yet mere concentration on the advantages of automatic gas heat will not be sufficient to gain wide public acceptance. For generations people have tolerated an inferior heating service because they have experienced nothing better. The suggestion that gas be used in place of coal or oil necessitates a change. And human nature automatically rebels at the thought of a change. The natural inclination is always to resist change.

For this reason the advertising must be designed to effect a transition from negative indifference to positive acceptance.

The first step in such a campaign is to create dissatisfaction with the existing heating service. The tiresome trips to the basement, the endless shoveling of coal and removing of ashes are matter-of-course incidents in the average prospect's life. They are the result of habit and as such they are not resented. The fact that they are burdens and that they are unnecessary must be pointed out to the public. This phase of the advertising must establish the inferiority and inadequacy of existing heating methods.

The second step of the campaign should correct the errors and misconceptions commonly held by the public. Practically every person will express an opinion upon gas heat. Investigation will reveal that such opinions have little foundation in fact and are generally traceable to rumors or gossip. Yet the objections contained in these opinions are real from the prospect's viewpoint and must be met. This phase of the campaign should take up these misconceptions and correct them carefully and logically.

The third phase of the campaign should create a desire for automatic gas heat. Having created dissatisfaction with the existing heating service in the first phase of the campaign it becomes necessary to give the pub-

lic something which can replace it. This phase of the campaign will stress the advantages of gas and contrast them with the deficiencies of their present equipment.

The fourth step should establish the economic value of the gas. While salesmanship can connect jobs to the line, these jobs will remain in service only when the customer is convinced that he is receiving value for his money. It makes no difference whether gas costs $10 or $60 more per year than coal. The premium, whatever it is, should be built up step by step with a dollar and cents value placed upon every discomfort which gas eliminates and upon every comfort which it adds. This step is of paramount importance in establishing the fact that the cost of coal heat is the cost of coal plus certain additional costs, while the cost of gas heat is the cost of gas alone.

The fifth step in the advertising can well consist of testimonials showing the class of people who are purchasing automatic gas heat and the degree of satisfaction they are obtaining. Advertising of this nature is extremely valuable in combatting the popular opinion that gas is expensive and beyond the means of the average family.

Sales Procedure: The success of the sales campaign will in the final analysis rest upon the ability of the sales force. Regardless of the merit of the advertising campaign, the actual orders must be obtained by the salesmen.

It is possible to train a sales organization and then let the men exercise their own initiative. This method, however, will never produce the results which a completely organized and synchronized method will produce.

Salesmen should be assigned definite territories which they should canvass systematically and arrange for definite appointments. The purchase of automatic gas heat is a major purchase with the average family and as such the presentation should be made to the husband and wife together. The presentation should be planned in advance and supported by a visual presentation which holds the prospect's interests and serves as a guide to a logical sequence in presenting the sales points.

Every aid should be extended the salesman and all red tape eliminated from his work. Forms, reports and clerical work should be reduced to a minimum and the salesman should not be burdened with collection work nor complaints.

The most important thing to impress upon the salesmen is the necessity for proper selection of prospects. The salesman's natural tendency is to consider a prospect to be a person who has the means to pay for gas heat. It is the salesman's job to interest such a person in gas heat and the salesman is evading the issue by confining his presentations to those people who express an interest.

It is impossible for the sales executive to give too much attention to the salesmen's efforts and results. Careful sales analyses should be made constantly and new ideas injected into the sales methods continually in order to maintain interest and enthusiasm.

The number of salesmen employed should be great enough to permit rapid coverage of the territory and give assurance that each potential customer has had an opportunity

Compressor Regulator

Speed Pump

Regulation Made Definite and Sure

EXCESS discharge pressure is relieved, discharge kept constant, and operation of the compressor at full speed made safe, by use of the C-F Compressor Regulator. As a close regulator of pressure on electric-driven pumps, it stands unrivalled. Gas, steam, air, water—in all such applications the C-F Compressor Regulator is thoroughly dependable. The lever type is here shown. A spring-loaded valve is also available and is equally sure in operation. Excess discharge pressure flows through without noticeable variation in suction line. Ask for descriptive pamphlet, also catalog of Chaplin-Fulton regulators for all requirements of gas-pressure control.

The Chaplin-Fulton Mfg. Company

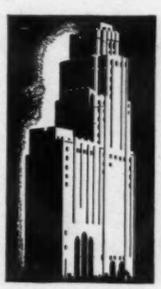
28-40 Penn Ave. Pittsburgh, Pa.

GENERAL CERAMICS COMPANY

REFRACTORIES

Refractories for conversion burners, space heaters, and circulating heaters. Made to exacting standards of quality—standards which are maintained by modern production methods, careful workmanship, and accurately controlled burning. Our engineers will gladly cooperate on new designs, alterations, production economies, etc.

General Ceramics Company, 71 West 35th Street, New York



In SAN FRANCISCO

the

WILLIAM TAYLOR HOTEL

Overlooking the Classic Civic Center

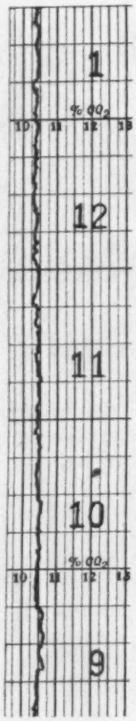
28 Stories—All Outside Rooms

Modern Hotel Luxury at Moderate Rates

Single room with bath: $3.00, $3.50, $4.00
Double room with bath: $4.00, $5.00, $6.00

WOODS-DRURY CO., Operators

James Woods, Pres. *Ernest Drury, Mgr.*



How's your CO_2 this morning?

It will pay you to match the records being made in plants firing boilers with DFC AUTOMATIC COMBUSTION CONTROL. In accompanying section of Brown strip chart, note (1) high Co_2, (2) absence of fluctuations. Proof that the DFC control holds gas and air to ideal ratio for maximum combustion efficiency.

Loads varied constantly during run charted, from 65% Rating to 120% Rating.

Investigate the new, amply proved - - - - -

DFC

AUTOMATIC COMBUSTION CONTROL

ASK FOR BULLETIN 320-W

THE DENVER FIRE CLAY COMPANY

DENVER DFC COLO. U.S.A.

BRANCHES AT SALT LAKE CITY. EL PASO. AND NEW YORK

PAPICO

ODORIZER Features

Continuous, automatic operation.

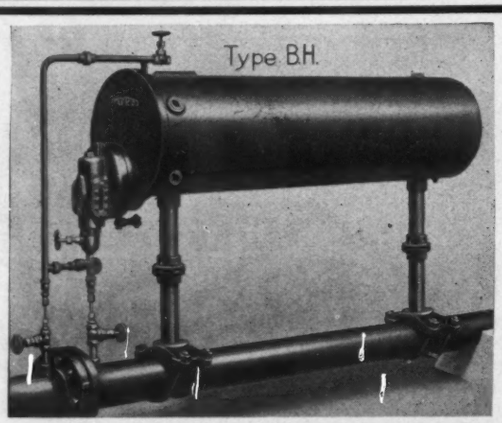
Odorant waste prevented.

Lowest operating cost.

Odorant injection substantially proportional to gas flow.

Bulletin No. 05 gives full details.

HARRY F. HALDEMAN, Inc.
Engineered Products
411 W. Fifth St., Los Angeles, Calif.



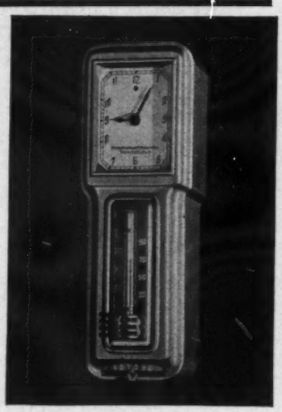
SATISFIED CUSTOMERS

■ Keep your customers satisfied by recommending and installing the Chronotherm*... the greatest achievement in the field of automatic heating. It provides unvarying temperatures and will entirely eliminate "Cold 70°", and save fuel by doing so. Minneapolis-Honeywell Regulator Co., 401 East 28th Street, Minneapolis, Minn.

■

MINNEAPOLIS-HONEYWELL

Control Systems



The Chronotherm*... Provides absolute unvarying temperatures and eliminates "Cold 70°".

* *Formerly called Thermochron.*

to learn about the proposal while the advertising is still fresh.

Economics of the Sales Campaign: It is obvious that the advertising expense, salaries and overhead of such a campaign will require a considerable sum of money. This will be a fixed expense regardless of the number of jobs sold.

To this fixed expense will have to be added the cost of the equipment and its installation and the commissions paid salesmen and executives. These latter expenses will vary with the number of jobs sold.

The sales price of the burner even on a rental basis will produce some profit over and above its cost and installation charge. Seldom, however, will this profit be sufficient to cover all of the fixed and variable expense.

The total deficit from the campaign should be divided by the number of jobs which will be sold to ascertain the unit sales cost. Business judgment will then dictate whether or not the expenditure is warranted.

Cooperation: The importance of complete cooperation cannot be too strongly emphasized. The sales department can secure jobs, but it cannot hold them. Automatic gas heat is sold at a premium on the idea that it relieves the customer from all worries in connection with his heating problem. This relief must be extended from the time the sale is made.

The installation of the burner should be made with a minimum of delay and disturbance to the customer. Service calls should be answered promptly and service rendered efficiently. Bills should be submitted correctly and on the proper rate. These are essential elements to the success of the sale. Yet they are all beyond the control of the sales department.

Because of this fact the sales manager should insist upon an executive conference prior to the start of the campaign and secure the endorsement of every department head as a requisite to the inauguration of the campaign. Failure to secure this endorsement may easily result in complete failure which in no way can be attributed to the sales department.

Dealer Cooperation: A plan of dealer cooperation should be included in the campaign. Dealers should be given unlimited territory and few restrictions imposed upon them. Obviously they should be required to sell approved equipment only and their estimates and installations should be subject to company approval.

With an acceptance of these conditions, however, dealers should be permitted to sell on company terms with the company accepting their indorsed paper just as is done with jobs sold directly. Moreover, a liberal scale of compensation should be provided so that dealers will be encouraged to employ their own salesmen and support the campaign in every possible manner.

The Individual Campaign: The sales campaign which is to be conducted by individualized selling will not differ from the mass sales campaign in fundamental principles.

However, it must of necessity be conducted by house-to-house canvass with little advertising support. Its success rests entirely with the salesman and the results will obviously be realized slowly.

Conclusions: In conclusion it can be said that the results of a planned sales campaign will be only as accurate as the original studies upon which it is based. Proper interpretation of the necessary data is essential to success.

However, when the projections have been soundly conceived, proper sales organization should produce the estimated results and the value of planning should be definitely established.

Welding Handbook Reissued In Enlarged Form by Lincoln

THE Lincoln Electric Co., Cleveland, Ohio, announces that a revised edition of "Procedure Handbook of Arc Welding Design and Practice" is now ready for distribution. The new volume contains over 450 pages with several hundred illustrations, and is indexed.

Some of the features which have been added to the revised edition are: weld inspection (visual, stethoscopic, electro-magnetic, X-ray and Gamma-ray); study of stress distribution by means of polarized light; a simplified method for the design of arc welded machinery; procedure and speeds for arc welding aluminum; technique and speeds for welding copper; construction of welded water lines.

Also included in the contents are descriptions of various welding processes, definition of welding terms, classification of welds, strength of welded joints, methods of stress relieving, tables for speed of welding all types of joints in all positions, methods for estimating cost of weld production, structures and properties of weld metal, specifications for steels and alloys of good weldability, the welding of non-ferrous metals, comparison of limitations of rolled steel and cast iron in machine design, construction details of basic machine parts built by welding, treatise on fundamental advantages of arc welded and riveted steel structures, details of structural arc welding, welding of automotive parts, construction and repair of bridges, use of arc welding in cement plants, gas plants, machine shops, mines, refineries, pipe lines, railroad shops, steel mills shipyards and hundreds of other interesting subjects.

The book is designed especially for the use of designers, engineers, welding operators, welding foremen, and for engineers responsible for the design of products which may be redesigned for welding construction.

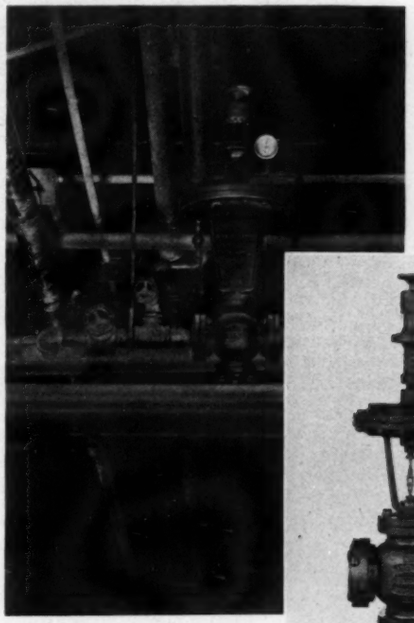
It is 5¾ inches by 9 inches, bound in semi-flexible simulated leather embossed in gold. Copies will be mailed postpaid in the United States by the Lincoln Electric Co. for $1.50 a copy. Foreign postage is 50 cents additional.

Ward Heater Adds New Retail Store in Los Angeles

H. J. Smith, president of the Ward Heater Co., Ltd., Los Angeles, Calif., announces opening of a retail store at 818 South Flower St., Los Angeles, in charge of E. E. Chard.

The Ward company has recently been appointed dealer for the Electrolux gas refrigerator, which will be displayed at the new location as will also the company's new line of water heaters.

AGAIN N.G.E.-WILGUS LEAD

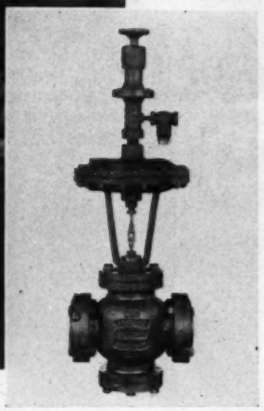


with the

TYPE R-17

Pressure Loaded

REGULATOR



N.G.E. Gas Burners
N.G.E. Liquid Level Controllers
N.G.E. Wilgus Gas Fuel and Pressure Regulators
Webster Radiant Gas Burners
Surface Combustion Industrial Furnaces
Janitrol House Heat Machines

The newly developed type R-17 regulator offers distinct advantages not found in either the weight or spring control units. Adjustment of controlled pressure may be made quickly and positively by a slight turn of the pilot valve. The pilot may be installed either on the regulator or in the control house, possibly hundreds of feet from the regulator. The type R-17 is recommended for the reduction of gas pressure to pounds or ounces from any inlet pressure.

NATURAL GAS EQUIPMENT INC.

Petroleum Securities Bldg., Los Angeles | 1123 Harrison Street, San Francisco | *Arizona Distributors:* Crane Co.

LOOK TO THE PIONEERS FOR CONTINUED LEADERSHIP

The Goodman Stopper

The Reliable Shut-off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, N. Y.

Pac. Coast Rep.: C. B. Babcock Co.
135 Bluxome Street
San Francisco, California

I Checked and Double Checked

the "Blue Book" PERSONNEL DIRECTORY of the Gas Industry —is Now Ready!

1934 EDITION

This directory gives the personnel of gas utility district offices as well as headquarter companies, arranged by states and including distributing companies, pipe line companies, producing companies and holding companies. Each distributing company lists the kind of gas served — pressure—B.t.u. content—number of meters—and indicates whether or not each company merchandises.

Correct as of January 1, 1934, it is the most complete and up-to-date directory available—includes the entire United States.

176 pages

Published in convenient Pocket Size! 5 x 7 in.

1-10 copies $2.50 ea.
10-20 copies $2.00 ea.
20 or more $1.50 ea.

MAIL COUPON TODAY!

WESTERN GAS, "Publishers",
810 South Spring Street,
Los Angeles, California.

Date.....

Please send me.....**copies of the "Blue Book" Personnel Directory, 1934 Edition, of the Gas Industry at $**..... **per copy, for which I enclose remittance of $**.....

Company name.....

Address .....

Reliance Regulator Bulletins Give Reference Data

Five new bulletins on various types of gas regulators have just been issued by the Reliance Regulator Corporation of Alhambra. Superceding all previous literature, these bulletins cover both low and high pressure regulators, as well as liquid petroleum gas regulators. The titles of the bulletins follow:

Bulletin No. 29—Reliance Type "Y" Low Pressure Appliance Regulator.
Bulletin No. 30—Reliance Liquid Petroleum Gas Regulators.
Bulletin No. 31—Reliance Type "K" Regulators.
Bulletin No. 32—Reliance Type "P" Regulators.
Bulletin No. 33—Reliance Type "A" Spring or Weight Loaded Pressure Appliance or House Regulators.

Each bulletin includes many graphs and tables showing operating characteristics of the respective regulators.

Copies may be obtained by writing to Reliance Regulator Corp., 1000 Meridian Ave., Alhambra, Calif.

"Guest Conductor" at All-Gas Cooking School

Katherine Rathbone, home service director for Southern Counties Gas Co., Los Angeles, in the Santa Monica district, acted as "guest conductor" at the first all-gas cooking school held by the Los Angeles Examiner under the direction of Prudence Penny, noted home economics authority. Miss Rathbone conducted a regular class session held recently at the Barker Bros. Auditorium, her demonstration featuring clock control in the modern gas range. Two ranges were used very effectively in the demonstration. A meal prepared in the morning before the class took session was cooked during the demonstration, and then the identical menu was prepared during the class. At the end of the demonstration the duplicate meal was ready for serving.

Minneapolis to Receive Texas Panhandle Supply

The Minneapolis (Minn.) Gas Light Co. has completed a contract with the Northern Gas and Pipe Line Co., of Omaha, Neb., to supply Minneapolis with natural gas from the Texas Panhandle field. Eight alternative rate schedules have been proposed to the city by the company, any one of which would result in a saving of $300,000 yearly to gas consumers. Mixed gas of 800 B.t.u. will be served in place of the present 550 B.t.u. gas, according to present plans.

Duemler and Olmsted Visit Pacific Coast For Walworth

F. W. Duemler, vice-president in charge of sales for the Walworth Co., New York, N. Y., with J. M. Olmsted, of the same company, were on an inspection tour of the Pacific Coast during April, visiting division offices of the company, oil fields and gas plants. Mr. Duemler returned to the New York office from Los Angeles, via Texas and Oklahoma, attending the International Petroleum Exposition at Tulsa, enroute. Mr. Olmsted extended his inspection tour up the coast.

Important Personnel Additions Made by Electrolux

IMPORTANT changes and additions to the executive personnel of Servel, Inc. and its sales subsidiary, Electrolux Refrigerator Sales, Inc., are announced by Axel Wenner-Gren, chairman of the board. Louis Ruthenburg has been elected president and H. A. Strong vice-president of both companies. F. E. Sellman was re-elected vice-president of the sales company, and Robert L. Hallock was appointed assistant to the executive vice-president.

Axel Wenner-Gren

These additions to the Electrolux organization, according to Mr. Wenner-Gren, are in line with the board's policy of steadily improving manufacturing methods and cooperation with distributing outlets.

Mr. Ruthenberg comes to the company with a fine background of manufacturing experience. He has been prominently identified with the refrigeration industry since early 1929, when he resigned the vice-presidency of the General Motors Truck Co. to become president of Copeland Products, Inc. In 1930 he was elected to the chairmanship of the Refrigeration Division of National Electrical Manufacturers Association.

Mr. Strong has behind him many successful years as a practical organizer and executive and is an acknowledged leader in specialty merchandising.

Mr. Hallock comes directly to Electrolux from The Brooklyn Union Gas Co.'s sales department, bringing a practical sales and utility company viewpoint with him.

Mr. Sellman has been with the company almost since its inception and has contributed largely to the rapid acceptance of Electrolux with the public and throughout the gas industry.

Catalog Available from Safety Gas Main Stopper Co.

Safety Gas Main Stopper Company announces the publication of a new catalogue featuring its entire line of street department and gas distribution department supplies. Among the new items described is the Special Service Testing Plug, with extension handle, that has recently been perfected. The catalogue also carries a description of the Peden-Goodman Stopper. Copies of the catalogue can be secured by writing Safety Gas Main Stopper Co. at 523 Atlantic Avenue, Brooklyn, N. Y.

Edward Hering, Acting Chief Engineer for U. S. Pipe

Edward Hering, formerly assistant engineer of the United States Pipe and Foundry Co., Burlington, N. J., has been made acting chief engineer of the company, to succeed T. P. Anthony, chief engineer, who resigned in April.

POINTING THE WAY

To More Efficient and Economical Industrial Gas Regulation

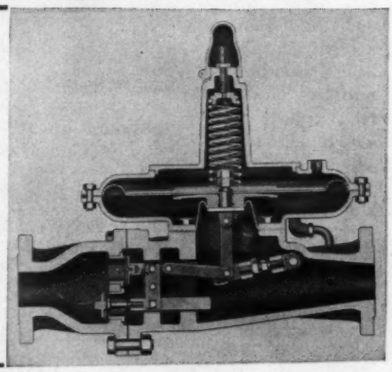
REYNOLDS

New Streamlined Double-Balanced Valve Toggle

REGULATOR

Write for Details

AT THE RIGHT— Cross-Section REYNOLDS NEW Streamlined Regulator which guarantees greater capacity— truer response—more uniform performance



REYNOLDS BRANCH OFFICES: 421 Dwight Bldg., Kansas City, Mo.; 2nd Unit, Santa Fe Bldg., Dallas, Tex.

REPRESENTATIVES: Eastern Appliance Co., Boston, Mass.; F. E. Newberry, Avon, N. J.; G. H. Unkefer, 428 Boyd St., Los Angeles, Calif.

REYNOLDS GAS REGULATOR CO.

Anderson, Indiana, U.S.A.

GAS CONTROL SINCE 1892

BARBER *Automatic Jet Gas* BURNERS *for* WARM AIR FURNACES *and* Steam and Hot Water Boilers

Illustrating a No. 324-B Barber Automatic Burner installed in a round warm air furnace. Note the proper position of the burner; its simplicity of installation and the excellent heat-producing scrubbing action of the flame.

There is none better than the Barber Automatic Gas Burner and Barber Pressure Regulator for warm air furnace Gas Conversion jobs, nor for standard burner equipment for new furnaces, boilers and appliances.

Barber's line of gas burners includes specially designed equipment for warm air heating and air conditioning systems. Make it your answer to the new-day demand for completely automatic heat.

Write at once for full information—NEW CATALOG and latest ATTRACTIVE DISCOUNTS, SELLING CO-OPERATION, ENGINEERING CO-OPERATION in specifying proper arrangement of Barber Burner Assemblies for your particular requirements.

THE BARBER GAS BURNER CO.

3704 Superior Ave. Cleveland, Ohio

NEW *Sales Literature*

Now Available!

Pacific
GAS HEATING HEADQUARTERS

Our Line for 1934!

- FLOOR FURNACES
  - CABINET HEATERS
    - WALL HEATERS
- GAS STEAM RADIATORS
  - RADIANT HEATERS
    - WATER HEATERS
- GRAVITY FURNACES
  - FORCED AIR FURNACES
    - UNIT HEATERS

The Outstanding Gas Appliance Line of the Pacific Coast. Write for complete information on any or all items . . .

Pacific Gas Radiator Co.
Main Office and Factory
Huntington Park, California
Oldest and Largest Manufacturer of Gas Heating Appliances in the West

Time Tells the Story

On new or reconditioned pipe lines, NO-OX-ID's remarkable record invites investigation. An engineer's reputation for sound judgment is strengthened when he selects time-proven NO-OX-ID and NO-OX-ID-IZED Wrapper. Recommendations and estimates submitted gladly.

DEARBORN CHEMICAL COMPANY
CHICAGO NEW YORK
LOS ANGELES
807 Mateo Street, Phone TRinity 3385
SAN FRANCISCO
421 Bryant St. Phone SUtter 8688

NO-OX-ID
IRON-OX-RUST
The Original Rust Preventive

It Pays To Advertise for Dealer Tie-In

(Continued from Page 11)

sales manager for P. G. and E., in which are discussed the major sales activities of the month. On its inside spread the broadside reproduces P. G. and E. newspaper copy for the month in advance, together with the current billboard, truck banner, and a window display. Information is given on number of publications to be used, and concrete suggestions are offered for dealer tie-in, using adjoining space to the company's newspaper insertions.

As a part of its dealer educational plan the company makes frequent mailings of literature on load-building equipment to the trade, some of these being supplied by manufacturers and imprinted by the P. G. and E., and others being company-prepared.

Dealer contact men located in each of the company's 12 divisions have important duties in connection with "advertising advertising" to dealers. They work under the local sales managers in each division, and in advance of special local sales work they call upon the dealers to encourage use of appropriate window and floor displays, special direct mailings where prospect lists are maintained, and effective current tie-in with company advertising. Full size proofs of P. G. and E. ads are delivered to dealers by these contact men in advance of each campaign.

Contact With Newspapers

Not only are the dealers urged to carry increased advertising in conjunction with company efforts; the newspapers throughout P. G. and E. territory are kept closely informed on company sales activities. Company advertising schedules and release dates on local insertions are arranged well in advance of publication. Dealer broadsides are also sent to the newspaper lists. Every month or two A. C. Joy, manager of P. G. and E.'s publicity department, writes a personal letter to principal newspapers, calling attention to the dealer bulletins and to timely possibilities for selling tie-in space. Frequent personal contact is made by the P. G. and E. advertising staff with 300 papers and magazines, to discuss plans for more productive local advertising cooperation with company schedules.

This type of promotional work through newspapers has often resulted in double-truck display pages, and these in turn are used to sell other newspapers on the potentialities of tie-in promotion. To the same purpose, the company advertises regularly in the California Newspaper Publishers Association Journal, which reaches all newspapers in the state. These messages cover the dealer advertising plan, and typical tie-in pages are reproduced in the copy. P. G. and E. advertising also appears in gas and electric industry papers with circulation in the company's area, telling how dealer advertising is effectively joining hands with company advertising to make more merchandise profits for dealers and build load for the company.

Each step in the above program has an important part in keeping dealers sold to the tie-in idea.

There are roughly 1500 dealers in the P. G. and E. territory, and obviously it is a major undertaking to arouse general interest among so large a number scattered throughout more than 300 communities. Having developed a degree of cooperation it still calls for month-by-month contact work to keep the interest at the action stage. As may be expected, the P. G. and E. experience is that the bulk of tie-in advertising will be carried on by a relatively few alert dealers. The plan operated for six months or more before much response became evident, and examination of the advertising record over the past two years shows that fewer than 100 dealers have done the advertising. However, this showing is much more creditable than might appear, for it is estimated that at least half of the dealers who are in a position to do effective advertising are participating in the tie-in plan today.

Increased Volume of Dealer Copy

To indicate the growth in advertising volume over the P. G. and E. territory resulting from the tie-in educational program, total volume of dealer advertising in 1933 ran to 5,160 column inches, or 32 8-column pages, with 500 separate pieces of copy. This total should be supplemented by numerous other insertions and special advertising not included in the newspaper lineage. In former years the same territory produced not to exceed 10 pages of dealer advertising.

As a part of its Spring, 1934, campaign on automatic gas water heating, the P. G. and E. has gone even farther in the direction of stimulating dealer participation in advertising. In San Francisco, Oakland, Berkeley and Alameda a special fund has been set up from which one-half of the cost of dealer advertising space will be paid by the company. This effort is designed for the one campaign only, and to avail themselves of the offer dealers must comply with a definite procedure governing type of advertising, terms advertised, appliances featured, and submitting of copy to the company for approval. Further details covering this cost-sharing plan were given in *Western Gas* for April.

Developing a definite routine for encouraging dealer advertising should be a part of every utility load-building scheme. From the standpoint of dealer relations alone the program is worthwhile, for it establishes a frequent and desirable company contact; and it talks to dealers in the most understandable of terms—increased merchandising profits from increased advertising.

Rushville, Ill. Votes Gas Plant

Rushville, Ill., on April 17 voted in favor of a municipal gas plant, construction to begin immediately.

DIRECTORY

Byllesby Engineering and Management Corporation

Wholly-owned subsidiary of Standard Gas and Electric Company

231 South La Salle Street, Chicago
New York Pittsburgh San Francisco

• HYDRAUGER •
MODERN HORIZONTAL BORING MACHINE
For Underground Installation of Pipe and Conduits. Avoids damage to costly Pavements and saves time. Send for Bulletin.
HYDRAUGER CORPORATION, Ltd.
343 Sansome Street • San Francisco, California

QUIET
GENERAL MAGNETIC GAS VALVE FEATURES:
Electric Hum Eliminated, ½-3" sizes. Low and High Voltage. Built for High Pressure Gas. Made in slow-opening types. Simple in Design—Infallible in Operation—Low in Price.
GENERAL CONTROLS CO., LTD.
1539 Folsom St. San Francisco

DANIEL ORIFICE FITTING
MEETS THE SEVEREST OPERATING CONDITIONS
LET US TELL YOU OF OUR LATEST DEVELOPMENTS
DANIEL ORIFICE FITTING CO.
1900 SANTA FE AVE. LOS ANGELES

SHEER 31-A MOTOR GAS VALVE
Now Entering Its Third Year
LEADS IN PERFORMANCE AND LOW PRICES
Also Hi-Lo Gas Valve, Step-Opening Gas Valve, Thermostats, Safety Pilots, Limit Controls, Space Heater Regulators, Humidifiers, Etc. . . . .
WRITE FOR CATALOG
H. M. SHEER CO., QUINCY, ILL.

GAS PIPE LINE MAP
Compiled by the Editors of WESTERN GAS
Size 45" x 45"
The most comprehensive published; covers the 22 western states in detail. Gives gas fields, names of natural gas communities; sizes of pipe lines and names of pipe line companies.
PRICES:
Printed on Cloth, $3.50
WESTERN GAS
810 South Spring St. Los Angeles, Calif.

"MODERNIZE as you repair"

THE SPRAGUE METER COMPANY
BRIDGEPORT, CONN.
Los Angeles, Calif. San Francisco, Calif.
Davenport, Iowa.
Newark, Ohio. Houston, Texas.

The heater that smiles while it warms

FRASER

Radiant Front Console

Imagine a circulating heater with all the added advantages of a cheerful open fireplace. It is absolutely new—a revolutionary contribution to gas heating.

Manufactured by

Fraser Furnace Company

Stockton, California

Distributed by

H. R. Basford Company

San Francisco Los Angeles

SOUTH CHESTER STEEL PIPE

Excels for Gas Service

The unusual care given to accuracy of diameter and welding qualities, makes Chester Pipe a favorite for gas lines.

SOUTH CHESTER TUBE CO.

Chester, Pa.

Work on Omaha Betterments Program Progressing

AT Omaha, Neb., work is progressing on the Metropolitan Utilities District's program of gas department betterments, which will involve an expenditure of approximately $111,000 and is financed by P. W. A. funds. Work on the 8,000,000 cubic feet gas holder, the largest single item on the improvement program, began March 1.

Betterments in the gas department of the District during 1933 included erection of a combination exhauster and booster at an approximate cost of $22,000; installation of an oil scrubber for removal of naphthalene and gums, at $30,000; by-pass for existing purifiers and station meter built in combination with a 30-inch header and connections at a cost of $10,000.

The steady increase in the output of gas in the Metropolitan Utilities District, according to T. A. Leisen, secretary and general manager, is due to activity in the merchandising department and the close cooperation extended appliance dealers. During 1933, 222 Electrolux gas refrigerators, 417 automatic water heaters, and 107 new house heating jobs were installed in the District.

Public Relations Course At L. A. G. and E. Corp.

Los Angeles Gas and Electric Corp., under the auspices of the Educational Committee of its Employees' Association, in March put under way a public relations course which was open to all employees and members of their families. No tuition charge was made and registration was restricted to the first 400 applicants for the course. Daniel L. Scott, manager of public relations for the company, is class director, and Leonard Blomgren, assistant chief meter reader, class sponsor.

Typical subjects to be dealt with in the 13 sessions of the course are: Our Service Policy and Practices, Our Commercial Policy and Practices, Government Ownership, The Courtesy Problem, Gas Utilization, Load Building, Utility Financing, The Woman as a Customer of the Utility, and Regulation and Rate Making.

J. P. Beardsley of Little Rock Gas & Fuel Co. Passes

J. P. Beardsley, Sr., public relations manager and statistician, Little Rock (Ark.) Gas and Fuel Co. and the Arkansas Natural Gas Co., passed away April 2. He was 60 years old. Mr. Beardsley, in his period with the gas industry, served the Cities Service Co. and the Pulaski Gas Light Co. at Little Rock, Ark.; Southwestern Gas and Electric Co., Shreveport, La.; and the Northern Indiana Public Service Co., Hammond, Ind.

Union Gas Co. to Operate Savonburg Plant

The Union Gas Co. of Independence, Kan., has applied for permission to operate the distribution plant at Savonburg, Kan. A line will be constructed to connect Savonburg with the company's system, to supply 250 meters in the community.

Classified Advertising

Classified advertising five cents per word; minimum $2.00 per insertion. Situation Wanted advertisements up to 50 words will be published three consecutive issues without charge. Small professional cards 1-in. deep by 21 ems wide are $6.00 monthly on 12-time contract.

Situations Wanted

Situation wanted as engineer, foreman or local manager with natural gas company in city of from five to ten thousand population. Eight years experience installing and servicing industrial, commercial and domestic burners and appliances. Age 29. Will give references. Address Box E-245, *Western Gas*, 810 South Spring St., Los Angeles, Calif.

Lincoln, Ill., May Get Natural Gas Service

The Central Illinois Electric and Gas Co., headquartering in Rockford, Ill., and which at present serves manufactured gas in Lincoln, Ill., has entered into a preliminary agreement with the Panhandle Illinois Pipe Line Co. of Springfield, Ill., to bring natural gas to Lincoln. The Panhandle Illinois Pipe Line Co. will apply to the Illinois Commerce Commission for a certificate of necessity and convenience, and right-of-way will be secured for the pipe line extension should the agreement be ratified by the boards of the two companies. Burt R. Bay of Kansas City, Mo., is president of Panhandle Illinois Pipe Line Co., and D. C. McClure is president of the Central Illinois Electric and Gas Co.

Linde Air Products and Haynes Stellite Exhibiting at I. P. E.

The Linde Air Products Co., New York, N. Y. and Haynes Stellite Co., of Kokomo, Ind., both subsidiary companies of Union Carbide Co., of New York, will exhibit at the International Petroleum Exposition to be held May 12-19, in Tulsa, Okla. The exhibits will occupy Booths 117, 119, and 121.

The Linde Air Products Co., will have on display a complete line of products for pipe line welding and cutting by the oxy-acetylene process. Haynes Stellite Co. will exhibit several types of hard-facing materials, including Haystellite inserts for hard-setting of drill bits.

Federal Public Service Corp. Buys Vicksburg Gas Co.

The Federal Public Service Corp., Chicago, Ill., purchased the Vicksburg (Miss.) Gas Co. at a foreclosure sale on March 14. F. A. O'Neill, treasurer of the Federal Public Service Corp., represented the holding company. No change in operations of the Vicksburg Gas Co. will be made.

HANDBOOK
BUTANE-PROPANE GASES

SECOND EDITION

THE HANDBOOK IS ISSUED EVERY TWO YEARS

Write for advertising rates and circulation data.
Address WESTERN GAS, 810 South Spring St., Los Angeles.

NOT A NEW PRODUCT

Tonging joint on 8⅝" O.D., 32 lb., Grade C, Republic Electric Weld Casing . . . Skelly Oil Co. Well No. 1 Long, Orlando Field, Orlando, Oklahoma.

9½ MILLION FEET

of Republic Electric Weld Casing and Tubing has been set during the last 3 years by leading producers in every field.

REPUBLIC

ELECTRIC WELD CASING and TUBING

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO